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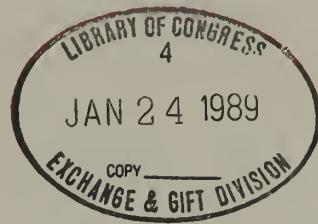
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Characterization of the 1986 Stone Mining Workforce

By Shail J. Butani and Ann M. Bartholomew



UNITED STATES DEPARTMENT OF THE INTERIOR

United States. Bureau of Mines
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UNITED STATES DEPARTMENT OF THE INTERIOR
Donald Paul Hodel, Secretary

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

h	hour	pct	percent
yr	year		

CHARACTERIZATION OF THE 1986 STONE MINING WORKFORCE

By Shail J. Butani¹ and Ann M. Bartholomew²

ABSTRACT

In 1986 the Bureau of Mines conducted a probability sample survey, Mining Industry Population Survey, to measure such employee characteristics as occupation; principal equipment operated; work location at the mine; present job, present company, and total mining experience; job-related training during the last 2 years; age; sex; race; and education. The population estimates are necessary to properly analyze the Mine Safety and Health Administration (MSHA) injury (includes illness and fatality data) statistics; that is, to compare and contrast injury rates for various subpopulations in order to identify those groups that are exhibiting higher than average injury rates.

This report uses the survey's results to characterize the U.S. stone mining workforce from March through September 1986. Similar reports have been published for the metallic, sand and gravel, and nonmetallic mining industries, as well as for the entire metal and nonmetal mining (includes metallic, stone, sand and gravel, and nonmetallic industries) sector and the coal mining sector.

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INTRODUCTION

According to the occupational safety and health (OSH) statistics published annually by the U.S. Department of Labor, Bureau of Labor Statistics, the mining industry (excluding oil and gas extraction) always has had one of the highest injury incidence rates among the major industry divisions. One of the primary objectives of the Bureau of Mines is to conduct research in the area of health and safety of the nation's miners, aimed at reducing the incidence rate of work-related injuries (includes illnesses and fatalities) in the domestic mining industry. In order to reduce the overall incidence rate, the Bureau needs to identify which groups or subpopulations of the workforce are exhibiting higher than average incidence rates.

To identify the high-risk groups, information about the injured workers and about the entire workforce is required. Present regulations permit MSHA to collect information on all mine injuries requiring medical attention. Hence, a data base containing various characteristics on the *injured* workforce is available. Since similar information about the *entire* workforce was not available, the Bureau conducted a probability sample survey called the Mining Industry Population Survey (MIPS), also known as the demographics survey, to collect the necessary data. The 1986 survey measured the following characteristics: job title or occupation, principal equipment operated, work location at mine, experience at present job, experience at present company, total mining experience, job-related training during the last 2 years, age, sex, race, and education. This demographics survey provided information about the population at risk and will aid research in pinpointing the hazardous segments of the population, as illustrated by the following example.

From MSHA's injury data base, it is known that 4,069 males and 66 females working in the U.S. stone mining industry were injured in 1986. If information about the population at risk (i.e., the number of male and female workers for the stone mining industry in 1986) is not known, then it is not valid to draw the conclusion that male miners are at a much higher injury risk than female miners. The estimates from the demographics survey show that there were a total of 68,649 male workers and 4,142 female workers (table E-15) employed in U.S. sand and gravel mining in 1986. Of these workers, the nonoffice workforce identified by occupation or job

title consists of 66,326 males and 1,490 females (table E-7). The reason for excluding office workers from the analysis is to account for some of the obvious difference in job risk. It should be noted that in the office worker category only 3 pct are males and 64 pct are females (table E-15). The added information on the population puts the injury statistics in a better perspective, as shown in table 1.

Table 1.—Population and injury statistics for 1986 stone mining sector

	Population statistics		Injury statistics			
	Workers	pct	Injuries	pct	Lost workdays	pct
Male . . .	66,326	97.8	4,069	98.4	61,920	99.1
Female . .	1,490	2.2	66	1.6	576	.9
Total . . .	67,816	100.0	4,135	100.0	62,496	100.0

Since the difference between the distribution of workers and lost workdays is relatively large, it would be interesting to further investigate the source of variation. Could the source of variation be job mix by sex?

Hence, the present research will aid in finding solutions to reduce the injury incidence rates for the high-risk groups. That is, the collected information will be used to compare and contrast the demographics composition of the hazardous groups with those of the safer groups. Thus, through present research, the differences and similarities between the two groups can be defined.

The purpose of this report is to provide the U.S. stone mining population estimates for March through September 1986 by various characteristics. This information is essential to performing the injury data analysis that is the ultimate goal of the survey.

In addition to this report, there are three companion reports (1-3)³ covering the metallic, sand and gravel, and nonmetallic mining industries. Summary reports have been published for the entire metal and nonmetal mining industry (4) and the coal mining industry (5).

ACKNOWLEDGMENTS

The authors thank the officials of the U.S. Department of Labor, MSHA, for submitting the MIPS justification package to the Office of Management and Budget for its clearance to collect the data. Special thanks go to Kathy Snyder, public affairs specialist, Office

of Information and Public Affairs, MSHA, for initiating the study, and to Edwin Thomasson, research liaison officer, Technical Support, MSHA, for his continuous effort and support.

SURVEY METHODOLOGY

POPULATION

The MIPS covered all workers employed in the anthracite coal (SIC⁴ 111), bituminous coal (SIC 121), metal (SIC 101-106, 109, 281), stone (SIC 141, 142, 324, 327), sand and gravel (SIC 144), and nonmetal (SIC I31, I45, I47, I49, 289, 299) mining industries

of the United States during the period March through September 1986. This report gives estimates only for the stone mining sector.

The information pertaining to the mine employees included in the survey was collected through the mine operators, because a comprehensive sampling frame (name and address file) of the workers in mine establishments was not available, and cost considerations prohibited the data collection through personal visits. The number of universe units (establishments under MSHA's jurisdiction) covered by the scope of this survey was approximately 18,350, with a total employment level of about 350,000. The number of establishments and employment for the stone mining was about

³Italic numbers in parentheses refer to items in the list of references preceding the appendixes at the end of this report.

⁴The Standard Industrial Classification (SIC) was revised in 1987; the industry group numbers used here are those in effect at the time of the MIPS.

3,370 and 80,000, respectively. The scope of the data for the employees covered by this survey is the same as that of the data collected by MSHA form 7000-1 for mine accidents, injuries, illnesses, and fatalities, and MSHA form 7000-2 for quarterly mine employment. The collection of the fundamental statistics reported on these two forms is required by law (30 U.S.C. 813; 30 CFR 50).

SAMPLE

The principal feature of the survey sample design was its use of two-stage stratified random sampling. The primary sampling units (first stage) were the mine establishments; the secondary sampling units were employees within each of the chosen mine establishments. The characteristics used to stratify the primary units were the industry (anthracite coal, bituminous coal, metal, stone, sand and gravel, nonmetal); mine type (underground, surface, plant or mill); employment size class (1-19, 20-49, 50-99, 100-249, 250-499, 500-999, 1,000 and above); and status code (active, intermittent). Since the first three stratification characteristics are highly correlated with the characteristics that the survey was to measure, use of stratified sampling increased the efficiency of the sample design and thus resulted in a smaller required sample size. The fourth characteristic, status code, was chosen so that nonresponse adjustment could be made within more homogenous groups. This is desirable because proportionately higher numbers of nonmailable, out-of-business, refusal, etc., responses are reported from intermittent mine establishments than from active mine establishments.

The sampling frame used for this survey was the 1985 preliminary address and employment file maintained by MSHA. A probability sample of 852 stone mining establishments from a universe of 3,373 stone mining establishments was selected by stratifying the frame as previously described and using a systematic sampling procedure with a random start for each stratum. The employees within an establishment were selected by using a systematic sampling procedure with a common random start for each employment size class.

A brief description of the sample allocation is as follows. For larger employment size classes, the allocation procedure placed all of the establishments on the frame in the sample as primary sampling units from which the employees were subsampled at a low frequency rate. As employment size class decreased, smaller and smaller proportions of the establishments were included as primary sampling units, but the employees within the establishments were subsampled at a higher frequency rate. The use of this procedure gave each employee, to the extent possible, about the same probability of inclusion in the sample, thus reducing the sampling variability. In order to limit the response burden for any one establishment, a maximum sample of 50 employees per establishment was selected.

DATA COLLECTION

The MIPS was conducted from March through September 1986 by mail questionnaire through the Bureau's Twin Cities (MN) Research Center. A reproduction of the original letter, followup letter, and the questionnaire bearing the Office of Management and Budget clearance number authorizing collection of the data are included in appendix F.

The response status for the stone mining sector from the original and followup mailings, as well as from telephone calls to the nonrespondents, is summarized here. From a total population of 3,373 stone mining establishments, the survey sampled 852 operations. The *overall response and rate* were 734 and 86 pct, respectively. There were 58 out-of-scope returns (i.e., out of businesses, nonmailables, duplicates, temporary inactives, and new

businesses under construction); the remaining 794 returns were within the scope of the survey (i.e., nonrespondents, usables, refusals, and unusables). Of the 794 in-scope records, 627 were usables. Thus, the survey achieved a *usable response rate* of 79 pct.

A brief description of the response terms follows:

<i>Response code</i>	<i>Description</i>
Nonrespondent	Received no response from the establishment.
Usable	Establishment provided usable data.
Refusal	Establishment refused to provide any data.
Unusable	Establishment provided data that were not in usable format.
Nonmailable	Establishment's address was either insufficient or wrong.
Duplicate	Data were combined with another establishment's data.
Out-of-business	Establishment was permanently closed.
New business	Establishment was in development stage.
Temporary inactive....	Establishment was temporarily not operating.

As part of the data collection phase, all the returns were reviewed and edited for completeness and reasonableness of the data. Whenever there were inconsistencies, the respondents were called for reconciliation. Also, almost all of the respondents that had initially refused to participate in the survey were contacted by phone. Approximately 80 pct of these respondents ultimately supplied data. Adjustments for those mine establishments that did not supply the data, or supplied partial data, are explained in the "Estimation Procedures" section and in appendix C.

DATA CODING, ENTERING, AND EDITING

The returns underwent a very comprehensive review and editing process in order to (1) minimize the reporting differences among the respondents (establishments), (2) ensure consistency of coding among the individual worker entries, (3) ensure the accuracy of the data entry, and (4) ensure compatibility of occupation and equipment coding with the MSHA injury data base.

ESTIMATION PROCEDURES

In a simple random sampling plan, all units are sampled with the same sampling ratio. To derive the population estimates, the sample units are weighted (replicated) by the inverse of the sampling ratio. Because of efficiency consideration, the data for this demographics study were collected using a complex survey design. Hence, the data for each worker, the ultimate sampling unit, were not equally weighted. Instead, the population estimates were derived by weighting data for each worker with the appropriate final weight of the data, which was the product of the following three factors: (1) the inverse of the sampling ratio with which the primary sampling unit (establishment) was sampled; (2) a nonresponse adjustment factor that was computed separately for each sampling stratum and assigned to all responding establishments in a stratum to account for those establishments in that stratum that did not respond; and (3) the inverse of the sampling ratio with which the secondary sampling units (workers) were selected. A detailed discussion of

the different weights and estimation formulas are given in appendix C. In statistical terms, the survey's estimates of the population total were based on a Horvitz-Thompson estimator (6).

No adjustment was made for partial nonresponse. That is, the characteristics that were left blank by the respondents were coded as unspecified and were, naturally, weighted by their appropriate final weight in computing the population estimates. The percentage unspecified for a particular characteristic gives the user an indication of the completeness of the schedules.

GROUPING OF CHARACTERISTICS

The original data base has detailed data for the characteristics mentioned below. For purposes of publication, the detailed data were combined into groups. Please contact the authors to obtain detailed data or a different grouping of the data for any or all of the characteristics.

Job Title and Principal Equipment Operated

Since the original data base has about 100 codes for each of these two categories (see appendixes A and B), the entries were combined into 20 to 25 groups. Similarities of the job title or principal equipment operated and number of workers in each entry were two of the main criteria used in forming the groups.

Employment Size Class

The classes used for this characteristic are the standard size class definition used by MSHA. Because there were very few mines for the size class having 500 through 999 employees, the estimates for this class were computed separately and then were combined with the estimates for employment size class 250 through 499 in order to protect the confidentiality of the mines as well as the workers. The combined size class is labeled as 250 through 999.

Present Job, Present Company, and Total Mining Experience

The data for all three of these characteristics were coded only as the number of years. It was felt that data were not reliable enough to be accurate to the month. The groupings were formed to be as compatible as possible to the groupings used by MSHA for its injury statistics.

Job-Related Training During Last 2 Years

The grouping for this characteristic was formed to reflect the definite and logical intervals that various mine operators employ and that meets the need of the mine safety personnel. The most frequently reported number was 16 h for training during the last 2 years; this is because MSHA requires a minimum training of 8 h/yr. Also, MSHA and safety personnel are interested in knowing the percent of workers who receive no training. Hence, both 0 and 16 h were categorized separately.

Age

The groupings for age were formed to be about the same as what MSHA uses for its injury statistics.

RELIABILITY OF ESTIMATES

As stated in reference 7:

All estimates derived from a sample survey are subject to sampling and nonsampling errors. Sampling errors occur because observations are made on a sample, not on the entire population. Estimates based on the different possible samples of the same size and sample design could differ. Nonsampling errors in the estimates can be attributed to many sources, e.g., inability to obtain information about all cases in the sample, mistakes in recording or coding the data, definitional difficulties, etc.

Nonsampling errors occur in a census as well as in a sample survey. As mentioned earlier, the completed forms underwent a very comprehensive review and edit process. This was primarily done to minimize the nonsampling errors.

In a probability sample, the coefficients of variation (CV's), which are a measure of the sampling errors in the estimates, can be estimated from the survey data. CV's were calculated for the basic characteristics as part of the survey estimation process; these CV's as well as the corresponding estimates for number of workers are given in tables E-41 through E-48. The CV's for other estimates can also be derived if requested. The methodology used to compute the estimated CV's is given below.

By definition, the CV of any sample estimate is equal to the standard error of the estimate divided by the value of the estimate (8). In other words, it is a measure of relative variation. Because the survey data will be used by numerous researchers to measure different statistics (e.g., totals, means, medians, percentages) by various cross-classification categories, it was not feasible to use the exact formula for the standard error estimates. Hence, a generalized formula that approximated the exact formula and that was easy to implement for computing all the standard error estimates was developed. It should be noted that since the survey uses a complex sampling design, the usual variance, standard deviation, and standard error estimates computed by the software packages are no longer valid because they are based on simple random sample design. The reliability measures for this survey were computed by employing a random group variance technique. A brief description of it is given in appendix D and a detailed discussion is given in reference 9.

The purpose of producing a reliability measure for this report is to define the confidence interval or range that would include the comparable complete coverage value. For example, the total number of estimated truck drivers for the 1986 stone mining was 8,808 (table E-1 and E-42) with a CV of 3.6 pct (table E-42). Based on this information, the standard error on the total number of truck drivers is 317 (estimate \times CV = 8,808 \times 0.036) and the 95-pct confidence interval is 8,174 to 9,442 (8,808 \pm 2 \times 317). This means that with 95 pct confidence, it can be said that the interval 8,174 to 9,442 includes the total number of truck drivers in the stone mining industry that would have been obtained from a census of the frame.

In general, the smaller the subpopulation size, the larger the variability in the estimates. Additionally, the larger the nonresponse, the less reliable the estimate may be. As mentioned earlier, nonresponse error is considered a nonsampling error. This error occurred more frequently for estimates of job-related training during the last 2 years and total mine experience than for other variables because conceptually these variables are harder to report. Moreover, it is possible that the training estimates might be somewhat biased because many respondents filled in 16 h, the minimum number of hours required by MSHA over a 2-year period.

VALIDATION OF ESTIMATES

Once the estimates were produced, they were validated for accuracy and reasonableness by several mining industry specialists. Additionally, the total employment for each industry was compared to an independent census conducted by MSHA, the results of which are reported in references 10 through 14. The injury experience reports tabulate the injury-illness-fatality data reported to MSHA on form 7000-1 and employment data reported on form 7000-2. While the data base used to compile the statistics for these reports contains detailed information for the injured victims, it does not contain similar information for the entire workforce. The breakdown of total employment is available only by type of ore mined, employment size class, and work location. Hence, the MIPS was conducted so that MSHA injury data could be analyzed in greater detail.

The data show that the overall employment figures from the two sources differed about 9 pct for the stone mining industry, with the MSHA figures being higher than those of the demographic survey. The difference in the estimates is caused in part by differences in reporting, coverage period, definitions, and methodology as explained below for data comparison by employment size class and by work location.

When comparing distribution of workers by employment size class, the differences between the data of the total row of table E-1 of this report and MSHA data as stated in table 4 of reference 11 are substantial. This is mainly due to the differences in definition and methodology. The MIPS classification is based on total employment of an establishment as it existed when the respondents filled out the questionnaire. MSHA collects employment on a quarterly basis, and for each quarter it is possible for the employment to be broken into a maximum of four different work locations; hence, each establishment may have up to 16 different employment figures.

Per MSHA's methodology, the size groups are classified according to the lowest numbered (primary) subunit's average employment of four quarters and *not on the total employment of*

an establishment, as is the case with the MIPS. For example, if an establishment's annual average employment is 60, but the employment for the primary subunit, say underground, is 15, then the establishment per MSHA's methodology is classified in size class 1 through 19, whereas according to the MIPS procedure it is in size class 50 through 99. It is for this reason the average employment per operation as stated in table 4 of reference 11 is 6.7 for size class 1-4. It should be noted that MSHA classification overestimates the employment in smaller size classes.

In view of the above, the injury data as published in reference 11 by size class should not be analyzed against the MIPS employment size class data. Instead, the analyst needs to retabulate the MSHA injury data from the original data tapes so that the size class definition corresponds to the MIPS.

Also, a large difference existed between MIPS and MSHA figures for employment distribution by work location. This is primarily due to differences in reporting. The employment reported to MSHA every quarter is in aggregate numbers for each work location (maximum of four). Generally, this type of reporting results in gross approximations in the breakdown of variables such as employment. For the MIPS data, the work location was reported for each worker in the sample, in the same manner as it is reported to MSHA on form 7000-1 for each injured worker. It should be noted that the data on work location for individual workers is known with more specificity than for the whole population. Hence, it is appropriate to analyze the survey work location data with MSHA injury statistics.

Additionally, a small portion of the difference in the two estimates is due to the job title category of office workers. The MIPS underestimated the number of employees in this category because many respondents assumed that these workers very seldom incur injuries and therefore were not to be reported. For the purposes of injury analysis, the office workers are to be excluded because of some of the obvious difference in the injury risk. Hence, the difference in counts of office workers does not make any difference.

SUMMARY OF MAJOR FINDINGS

The findings of the survey by various cross-classifications are given as estimates in tables E-1 through E-40; tables E-41 through E-48 give reliability estimates for the basic characteristics and a detailed discussion of their use is given in the "Reliability of Estimates" section. If desired, the estimates by some other classification criteria including more detailed estimates (e.g., distribution of workers by age and experience at present company working at the plant or mill location) can be derived from the original data base. The following findings are based on the data for the entire 1986 stone mining workforce.

- The total estimated workforce for 1986 was approximately 73,400 (table E-1). The data in table E-1 also indicate that 49 pct of the workforce was employed in establishments with 49 or less employees, 45 pct in establishments with 50-249 employees, and 6 pct in establishments with 250 or more employees.
- The two largest categories of workers were mechanic-welder-oiler-machinist and plant operator-warehouseman with 16 pct of the employment (table E-1). The laborer-miner-utility man, and truck driver categories each made up another 12 pct; and each of the remaining occupation groupings had fewer than 10 pct of the employees.

- The distribution of workers by work location was surface mine, 49 pct; plant or mill, 39 pct; office 10 pct; and the locations underground mine and surface at underground mine each consisted of 1 pct (table E-3). The data in table E-3 also show that in the smaller establishments there were proportionately more workers at the location surface mine, while in the larger establishments there were proportionately more workers in the plant or mill area.
- A comparison of the workers by job title and experience at the job (table E-10), experience at company (table E-11), and total mining experience (table E-12) shows that the category manager-foreman-supervisor (general) had the highest median experience with 8, 14, and 17 years, respectively.
- Of the female employees, 64 pct had the job title category office workers, compared with 3 pct of the males (table E-15).
- A comparison of education for the two major work locations shows that 74 pct of the plant or mill workers and 64 pct of the surface mine workers had high school or better education (table E-27). Note: These percentages were based on data entries for which education was specified.

The following findings are based on stone mining data that exclude the job title category of office worker.

- The largest category of equipment operated was handtools (powered and nonpowered) with 15 pct of the employment, followed closely by the category none with 14 pct, plant equipment and haulage truck each with 13 pct, and front-end loader-forklift with 11 pct (table E-2).
- The median experience at present job, present company, and total mining were 5, 8, and 9 years, respectively (table E-4). Both median experience at present company and at mining were higher for establishments with 100 or more employees than for establishments with less than 100 employees.
- Mean job-related training during the last 2 years was 48 h (table E-5).
- Mean age was 40 years (table E-6). The age group 50 and over had the largest number of workers (16,466) followed closely by the 40-49 age group (15,150); these two groups made up about 46 pct of the workforce.
- Males made up 98 pct of the workforce (table E-7). Note that the 98-pct figure excludes the unspecified category.
- Whites, blacks, and Hispanics made up 82, 7, and 8 pct, respectively, of the workforce (table E-7). The remaining 3 pct workers belonged either to another race or were unspecified.
- Of those workers whose education was specified, 69 pct had a high school or better education (table E-7). Note that this figure is obtained by (1) summing the workers in the categories high school diploma, vocational diploma, some college, and college degree, and (2) dividing this sum by the total number of workers minus the workers in the unspecified category. In this case, it is 43,560 divided by 62,977.

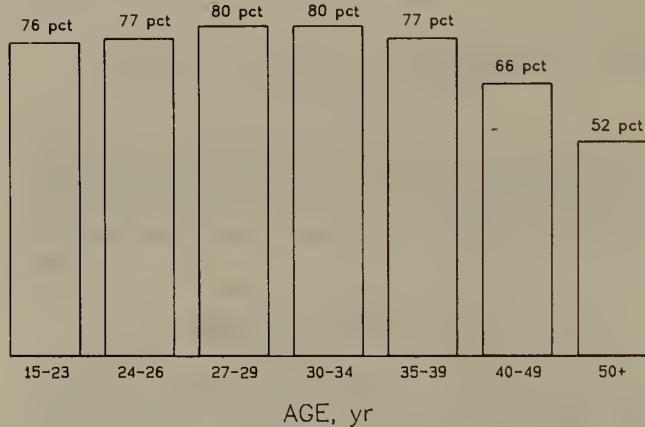


Figure 1.—Percentage of 1986 stone mining workforce with at least a high school diploma, by age (excluding job title category of office worker, as well as workers whose education was unspecified).

- The distribution of workers by equipment operated varied considerably between males and females (table E-21). This was especially true for the principal equipment categories handtools (powered and nonpowered), scale-lab equipment-controls, and none. For example, scale-lab equipment-controls was the principal equipment operated by 37 pct of the females compared with 4 pct for males. Handtools was the largest principal equipment operated category for males (16 pct); for females this category was 3 pct.
- There was a higher percentage of employees with at least a high school education under the age of 40 than there were of age 40 and over (table E-38 and figure 1); proportionately more females had a high school or higher education than males (table E-39 and figure 2); education categorized by race (table E-40) is shown in figure 3.

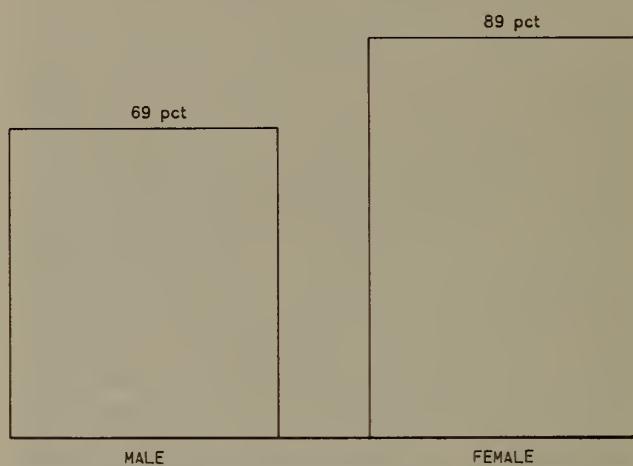


Figure 2.—Percentage of 1986 stone mining workforce with at least a high school diploma, by sex (excluding job title category of office worker, as well as workers whose education was unspecified).



Figure 3.—Percentage of 1986 stone mining workforce with at least a high school diploma, by race (excluding job title category of office worker, as well as workers whose education was unspecified).

APPLICATION OF DATA FOR INJURY ANALYSES

The ultimate objective of this study is to provide a basis for—

1. Analyzing the 1986 MSHA stone mining injury statistics and identifying those subpopulations exhibiting higher or lower than average injury rates.
2. Producing some selected estimates by geographic location such as regions (east, central, west), MSHA districts, or States, and performing injury data analyses.
3. Producing some selected estimates by standard industrial classification (SIC) codes such as crushed stone and dimension stone, and performing injury data analyses.

4. Developing an easy to use computerized data base that would be available to the researchers to do their own analyses, especially in the area of targeting injury prevention and training efforts.

The results from these analyses, which encompass all facets of mining operations, can help identify areas where research efforts should be devoted to achieve the greatest safety improvements, thus preventing creation of unnecessary regulations or crash research programs that tend to waste funds.

RECOMMENDATIONS FOR FUTURE WORK

1. After the injury analyses are performed, and the hazardous areas or subpopulations have been identified, it would be desirable to further investigate their problems and needs. This can be accomplished by conducting some special surveys such as an equipment use survey, maintenance related work survey, small mines survey, etc.

2. Repeat the MIPS and perform the injury analyses periodically, say every 3 to 5 years, in order to study the changing mining

environment and its impact on mining safety and productivity. When the survey is repeated, it is recommended that modifications be made to the questionnaire to reflect new needs. It is also recommended that the collection of total mine experience and job-related training data be eliminated, since these variables are conceptually very hard to measure. Also, the variables experience on the job and experience with the company should be measured in years only.

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APPENDIX A.—STONE MINING INDUSTRY JOB TITLE GROUPING

<i>Description</i>	<i>Job title code</i>
Backhoe-crane-dragline-shovel operator	367, 378, 778, 387
Beltman-belt repairman	601, 1012, 996
Blaster	807
Deckhand-barge and dredge operator	372
Dozer-heavy and mobile equipment operator	368, 768, 985
Driller-rock bolter	33, 34, 333, 334, 1056, 46
Electrician-lampman	402, 602, 603, 385
Front-end loader-forklift operator	382, 782, 825, 389
Grader-scraper operator	375, 775, 957
Laborer-miner-utility man	616, 53, 316, 36, 38, 39, 45, 57, 58, 59, 158, 216, 224, 327, 386, 395, 609, 624, 663, 710, 716, 874, 997, 1013, 1055
Manager-foreman-supervisor:	
General	430, 449, 481, 489, 494
Maintenance	418
Working	749
Mechanic-welder-oiler-machinist	404, 604, 605, 1019, 1018, 1060, 394, 608
Mine technical support	320, 393, 396, 414, 423, 456, 464, 495, 593, 594, 920, 921, 930, 965, 998, 1014
Office worker	497
Plant operator-warehouseman	374, 379, 380, 388, 390, 392, 1022
Shuttle car-tram operator	850, 28, 29, 269, 373, 728, 962, 969
Truck driver	376, 776

<i>Code</i>	<i>Description</i>	<i>Code</i>	<i>Description</i>
28.....	Scoop tram operator	269.....	Chute puller, underground
29.....	Mucking machine operator		Locomotive operator
33.....	Driller helper, underground		Car loader underground
34.....	Exploration driller, underground		Whistle punk, underground
	Longhole driller, underground	316.....	Service truck operator
	Prospect driller, underground		Laborer
	Diamond driller, underground		Track gang, surface
36.....	Continuous miner operator		Surface worker
38.....	Cutting machine operator		Utility man, surface
39.....	Hand loader		Pumper, surface
	Trammer		Tamping machine operator
45.....	Hangup man	320.....	Cage attendant, surface
	Rockman		Aerial tram—outside only
	Raise blaster	327.....	Surface miner
	Chute blaster	333.....	Driller helper
	Rock handler	334.....	Carriage-mounted drill operator, surface
46.....	Pinner		Wagon drill operator, surface
	Truss bolter		Churn driller, surface
	Rock bolter		Rotary drill operator
	Roof trimmer		JP drill operator, surface
	Roof man		Air-track driller, outside only
	Scaler operator	367.....	Backhoe operator
	Roof bolter		Power shovel operator
53.....	Nipper		Pitman
	Utility man	368.....	Dozer operator
57.....	Stope miner		Track operator helper, surface
58.....	DXC miner		Tractor operator, surface
	Drift miner	372.....	Deckhand
59.....	Raise miner		Dredge operator
158.....	Rock machine operator, underground		Barge attendant
216.....	Trackman		Barge loader
224.....	Trainees, underground		Boat operator

<i>Code</i>	<i>Description</i>	<i>Code</i>	<i>Description</i>
373.....	Car dropper	398.....	Sawyer
374.....	Storekeeper		Stone finishing
	Blunger	399.....	Dimension stone cutter-polisher
	Process operator	402.....	Master electrician
	Sandbox operator	404.....	Master mechanic
	Mill operator	414.....	Laboratory assistant
	Reagent operator		Analyst
	Car loader, surface		Laboratory technician
	Warehouseman		Laboratory supervisor
	Shipping		Quality control
	Media operator		Dust sampler
	Breakerman		Emission control specialist
	Crusher operator	418.....	Maintenance supervisor
	Sewing machine operator		Maintenance foreman
	Boney preparation plant operator	423.....	Surveyor
	Packaging	430.....	Assistant mine manager
	Cleaning plant operator		Assistant mine foreman-vice president
	Truck loader	449.....	Mine owner
	Bagger-baler		Assayers
	Preparation plant operator		President
	Cobber		General foreman
375.....	Grader operator, surface		Mine manager
376.....	Truck driver, surface		Mine foreman
378.....	Dragline operator	456.....	Engineer
	Dropball operator		Metallurgist-geologist
	Crane operator, surface		Chemist
379.....	Kiln operator	464.....	Inspector
	Calciner	481.....	Superintendents
	Dryer operator		Project managers
380.....	Fine coal plant operator		Coordinators
382.....	Loader operator		Supervisors
	Front-end loader operator, surface	489.....	Outside foreman
	Pan operator	494.....	Plant manager
	Scraper operator		Mill manager
	Hightlift operator		Plant foreman
	Payloader operator		Mill foreman
385.....	Lampman	495.....	Safety coordinator
386.....	Refuse truck driver		Safety manager
387.....	Rotary bucket excavator operator		Safety director
388.....	Separator operator		Environmental coordinator
	Scalper		Safety engineer
	Shaker operator	497.....	Office help
	Screen operator		Computer operator
389.....	Forklift operator		Controller
390.....	Silo operator		Clerk
392.....	Washery operator	593.....	Nurse
	Topman	594.....	Training specialist
	Skip dumper	601.....	Conveyor man
	Binman		Belt walker
	Scrubber operator		Belt installer
	Tipple operator-attendant		Tunnel worker
393.....	Scaleperson		Tailpiece man
	Weighman-weighmaster		Belt mover
394.....	Carpenter		Mobile bridge carrierman
395.....	Water truck operator		Beltman
396.....	Watchman	602.....	Lineman
	Security guard		Electrician

<i>Code</i>	<i>Description</i>	<i>Code</i>	<i>Description</i>
603.....	Electrician helper	807.....	Chargeman
604.....	Fueler		Shot firer
Boilermaker			Powder man
Plumber			Blaster
Pipefitter			Airdox operator
Boiler operator			Loading hole shooter
Pipe man			Powder monkey
Boiler trainee		825.....	Bobcat operator
Mechanic		850.....	Ramcar operator
Repairman			Shuttle car operator
Mill wright			Buggy operator
605.....	Mechanic helper	874.....	Mine equipment operator
608.....	Mason	920.....	Cager
609.....	Supplyman	921.....	Hoist operator
Material man			Hoist engineer
616.....	Rock picker		Shaftman
Parts runner		930.....	Skip tender
Groundman		957.....	Scraper operator
Unit helper		962.....	Car runner, surface
Bathhouse attendant			Trip rider
Pointman			Brakeman
Laborer			Flagman
Slate picker			Car rider
Roustabout			Conductor
Extra man		965.....	Dispatcher
624.....	Trainees	969.....	Swamper
Apprentice			Motorman
663.....	Ledgeman		Switchman
Quarry man		985.....	Heavy equipment operator, surface
Miner, not elsewhere classified			Mobile equipment operator, surface
Shaft miner		996.....	Feeder man
Probeman		997.....	General or many equipment operator
710.....	Propman	998.....	Janitor
Timberman			Bag stenciler
716.....	Cement man		Prospector
Form man			Painter
Grizzly tender		1012....	Belt repairman
728.....	Gizmo operator		Belt vulcanizer
Load-haul-dump operator, underground		1013....	Cleanup man
749.....	Shift boss	1014....	Sampler
Foreman-leadman		1018....	Lube man
Bullgang foreman			Greaser-oiler
Labor foreman		1019....	Welder
Section boss-foreman		1022....	Dump man
768.....	Heavy equipment operator		Dump operator
775.....	Grader operator, underground	1055....	Chainman
776.....	Truck driver, underground	1056....	Rock driller
778.....	Cherry picker	1060....	Machinist
Crane operator, underground			Shopman
Dragline operator, underground			Shop foreman
Backhoe operator, underground			Bit sharpener
Gradall operator			
Front-end loader operator, underground			

APPENDIX B.—STONE MINING INDUSTRY EQUIPMENT OPERATED GROUPING

<i>Description</i>	<i>Equipment code</i>
Backhoe-crane-dragline-shovel	60, 14
Belt	13, 96
Dozer-heavy and mobile equipment	8, 85
Drill (underground)-rock bolter	53, 54, 49
Drill (surface)	9
Explosives	47
Front-end loader-forklift	24, 23
Grader-scraper	52, 57
Handtools (powered and nonpowered)	28
Hoist-elevator	30, 19, 38
Many equipment	97
Miscellaneous utility equipment	95, 12, 16
Plant equipment	40, 7, 10, 11, 15, 18, 22, 26, 32, 39, 46, 51, 58, 69, 82, 83
Pump	48
Scale-lab equipment-controls	92, 80, 91
Shuttle car-locomotive	61, 34, 33, 41, 42, 43, 65
Stone cutting-finishing machine	17
Truck (haulage)	44, 45
Truck (utility)-personnel carrier	67, 37, 66
Welding machine-lathe	70, 5
None	0
Not elsewhere classified	98, 68, 71, 81, 88
Unspecified	99

<i>Code</i>	<i>Description</i>	<i>Code</i>	<i>Description</i>
0	None	15	Breaker
5	Drill press		Crusher
	Bench grinder	16	Cutting machines
	Lathe		Undercutter
7	Boats		Chain cutter
	Barges	17	Polishing machinery
	Water transportation		Dimension stone cutting
8	Bulldozer	18	Dredge
	Dozer	19	Elevator
	Crawler tractor		Buckets
9	Carriage mounted drill		Cage
	Jumbo drill		Skip
	Churn drill	22	Precipitator heavy media bath
	Rotary drill		Filters
	Jet piercing drill		Flotation machines
	Airtrack compressor drill	23	Forklift
10	Chute	24	Highlift
	Airslide		Skip tender
11	Classifier		Front-end loader
	Cyclones		Payloader
12	Continuous miner	26	Grizzlies
	Dosco miner	28	Handtools (powered and nonpowered)
13	Belt feeder		Ram jack
	Mobile bridge carrier	30	Hoist
	Conveyor		Car dropper
	All types belts		Hydraulic jack
14	Cherry picker	32	Impactor
	Basket scaler	33	Scoop tram
	Scaling machine		Unitrac
	Rock or dropball		Load-haul-dump
	Boom hoist		Teletram car
	Derrick		Bobcat, underground
	Crane		
	Gantry		

<i>Code</i>	<i>Description</i>	<i>Code</i>	<i>Description</i>
34.....	Locomotive	54.....	Pinner
	Trammer		Roof bolting machine
	Tow-motor	57.....	Pan scraper
	Lorry car		Scoop, surface
	Rail-mounted locomotive		Self-loading scraper
37.....	Porta bus		Tractor scraper
	Mancar		Scraper loader
	Golf cart	58.....	Shaker
	Mantrip		Vibrator
	Rail runner		Screen
	Rail rover	60.....	Dragline
	Personnel carrier		Dragline bucket
	Boss buggy		Backhoe
	Jeep		Power shovel
38.....	Man lift		Clamshell
	Scaling rig	61.....	Buggy
39.....	Grinding mills		Shuttle car
	Ball or rod mills		Ram car
40.....	Milling machinery	65.....	Track maintenance
	Block press		Track repair equipment
	General plant equipment	66.....	Tractor, underground
41.....	Nipper truck, underground		Elkhorn
	Mine car, underground		Supply car
	Underground flatcar	67.....	Trash truck
	Timber truck, underground		Service truck
42.....	Mine car, surface		Utility truck
	Ore-coal car, surface		Water truck
	Boxcar, surface		Dump truck
	Hopper car, surface		Pickup truck
43.....	Mucking machine	68.....	Tugger
	Overshot loader		Air winch
44.....	Ore haulage trucks, offhighway	69.....	Washers
45.....	Payloader ore haulage, onhighway	70.....	Welding machine
46.....	Bagger		Torch
	Sewing machine	71.....	Machines, not elsewhere classified
	Packaging machine		Rock rake
47.....	Pneumatic blast agent loader		Drilling rigs
	Pop shooter		Impact roller
	Driller loader	80.....	Lab equipment
	Prill loader	81.....	Rigs, not elsewhere classified
	Powder buggy	82.....	Boilers
	Explosives	83.....	Furnaces
48.....	Pump		Calciners
49.....	Raise borer		Kilns
51.....	Raw coal storage		Dryers
	Tipple	85.....	Heavy equipment
	Dump bins		Mobile equipment
52.....	Roadgrader	88.....	Diesels
	Motor grader	91.....	Controls
	Motor patrol		Consoles
53.....	Jackleg	92.....	Scales
	Drifter drill	95.....	Miscellaneous utility equipment
	Airleg	96.....	Feeders
	Diamond drill	97.....	Many-all types of equipment
	Track drill	98.....	Not elsewhere classified
	Jumbo drill	99.....	Not specified
	Rock drill		
	Buzzy drill		
	Jackhammer		
	Hydraulic drill		
	Stoper drill		

APPENDIX C.—ESTIMATION PROCEDURES

Establishment weight.—Suppose one out of every five mine establishments in a sampling stratum (industry-mine type-employment size class-status) was selected. Then, the sampling ratio is 1/5, and the establishment weight (EWT) is 5.00, the inverse of the sampling ratio.

Nonresponse adjustment factor.—Also suppose in a given sampling stratum, 80 pct of the establishments that were within the scope of the survey responded. Then, the nonresponse adjustment factor (NRAF) is 1.25 (i.e., 100/80).

Worker weight.—Additionally, there was the sampling ratio with which the workers in the establishment were sampled; the worker weight (WWT) ranged from 1.00 to 30.00 (see the first page of the MIPS questionnaire in appendix F). Theoretically, all the workers in a sampling stratum should have had the same weight. Hence, there would have been no need to assign weight at the worker level, as the worker weight could have been incorporated into the establishment weight. In practice, however, this is seldom the case because for a few establishments the employment level changes from what it was on the sampling frame to the time of the survey data collection. Since all the establishments did not report in the same employment size class that they were sampled in, it was necessary to also assign each worker a weight.

Final weight.—For the purpose of computing the estimates, each worker was assigned a final weight (FWT) which was the product of establishment weight (EWT), nonresponse adjustment factor (NRAF), and the worker weight (WWT). That is, $FWT = EWT \times NRAF \times WWT$.

Estimates of number of workers.—The estimates of the total number of workers were computed by (1) summing the final weights over the appropriate domain, and (2) rounding the sum to the nearest integer.

Example: To estimate the total number of truck drivers:

$$1. \text{ Compute } x = \sum_{i \in D} FWT_i.$$

Where the domain D was the set of all records (workers) that had an occupation code of truck driver.

$$2. \text{ Compute } y = \text{round}(x).$$

Estimates of mean.—The estimates of mean age (training) were computed by summing over the appropriate domain (1) the product of age (training) and final weight, (2) the final weights, and then (3) dividing the sum of the products by the sum of the weights and rounding the result to the nearest whole number. It should be noted that for each domain only those entries where age (training) was specified were included in the computation.

Example: To estimate the mean age of the truck drivers:

$$1. \text{ Compute } x = \sum_{i \in D} (\text{Age}_i * FWT_i).$$

$$2. \text{ Compute } y = \sum_{i \in D} FWT_i.$$

Where domain, D, is the set of all records that had an occupation code of truck driver with age being specified.

$$3. \text{ Compute } z = \text{round}(x/y).$$

Estimates of median.—The estimates of median job, company, and mining experience were derived by (1) sorting over the domain the records in ascending order of the experience for which the median statistic was desired, (2) computing the total number of workers (NW) in the domain by summing the final weights, and (3) selecting the experience corresponding to the middle worker(s) in the ordering. That is, if NW is an odd number, then the median experience is the experience corresponding to the $(NW/2 + 1)$ th worker in the ordering; if NW is an even number, then the median experience is the midpoint (rounded to the nearest integer) of the experience corresponding to the $(NW/2)$ th and $(NW/2 + 1)$ th worker in the ordering. As with the mean estimates, the median estimates also excluded those entries in the domain with unspecified experience.

APPENDIX D.—RELIABILITY OF ESTIMATES: RANDOM GROUP VARIANCE TECHNIQUE

The random group method of variance estimation employed in this study consisted of selecting eight samples using the same sampling scheme for each sample as the parent sample. The primary sampling units (establishments) were divided into two sets. The first set consisted of noncertainty (probability of selection less than 1.00) primary sampling units sorted by their original industry-mine type-employment size class-status. A random integer, say j , between 1 and 8 was generated. The first primary unit in the ordering was assigned to the random group j , the second to the random group $j + 1$, and so forth in a modulo 8 fashion. Then, the secondary sampling units (workers) were assigned the same random group number as the primary unit to which they belonged. The second set consisted of all secondary sampling units belonging to the certainty (probability of selection equal to 1.00) primary sampling units. The secondary sampling units were sorted by the same scheme as above, and a random integer, say k , between 1 and 8 was generated. Then, the first secondary unit in the ordering was assigned to the random group k , the second to the random group $k + 1$, and so forth in a modulo 8 fashion. Hence, each worker belonged to a random group. For a more detailed discussion of the random group technique, the reader is referred to reference 9 of the main text.

The following procedure was followed in computing the estimated variance (var), standard error (s), and the coefficient of

variation (CV) for the estimated number of workers belonging to a particular category.

1. The domain (i.e., category) was defined.
2. A separate estimate for total number of workers, $\hat{\theta}_i$, for each of the eight random groups was computed. If any random group was empty, then a zero was assigned to that random group.
3. Total number of workers, $\hat{\theta}$, for all eight groups was computed as

$$\hat{\theta} = \hat{\theta}_1 + \hat{\theta}_2 + \dots + \hat{\theta}_8.$$

4. The mean number of workers per group was computed as

$$\bar{\hat{\theta}} = \hat{\theta}/8.$$

5. The variance for $\hat{\theta}$ was computed as

$$\text{var}(\hat{\theta}) = 8 \sum_{i=1}^8 (\hat{\theta}_i - \bar{\hat{\theta}})^2.$$

6. The standard error of $\hat{\theta}$ was computed as

$$s(\hat{\theta}) = \sqrt{\text{var}(\hat{\theta})}.$$

7. The CV for $\hat{\theta}$ was computed as

$$\text{CV}(\hat{\theta}) = \frac{s(\hat{\theta})}{\hat{\theta}} \times 100.0.$$

APPENDIX E.—STONE MINING 1986 WORKFORCE ESTIMATES

Table E-1.—Stone mining 1986 workforce estimates: job title, by employment size class¹

Job title grouping ²	1-19		20-49		50-99		100-249		250-999		Total	
	Workers	pct										
Backhoe-crane-dragline-shovel operator	694	4	566	3	381	4	420	2	55	1	2,118	3
Beltman-belt repairman	81	0	56	0	6	0	123	1	53	1	319	0
Blaster	113	1	145	1	18	0	59	0	0	0	336	0
Deckhand-barge and dredge operator	0	0	26	0	0	0	134	1	10	0	171	0
Dozer-heavy and mobile equipment operator	484	3	435	3	207	2	597	3	53	1	1,775	2
Driller-rock bolter	926	5	660	4	156	2	266	1	50	1	2,058	3
Electrician-lampman	13	0	108	1	187	2	893	4	232	5	1,433	2
Front-end loader-forklift operator	2,863	15	1,654	10	646	6	843	4	89	2	6,095	8
Grader-scraper operator	121	1	95	1	105	1	94	0	0	0	415	1
Laborer-miner-utility man	1,776	10	1,795	10	1,184	12	3,274	14	742	17	8,771	12
Manager-foreman-supervisor:												
General	1,817	10	1,211	7	502	5	895	4	119	3	4,543	6
Maintenance	18	0	135	1	102	1	363	2	89	2	708	1
Working	113	1	396	2	590	6	1,035	4	228	5	2,362	3
Mechanic-welder-oiler-machinist	1,335	7	2,471	14	1,917	19	4,762	21	973	23	11,458	16
Mine technical support	629	3	874	5	669	7	1,998	9	354	8	4,524	6
Office worker	1,354	7	967	6	805	8	1,510	7	374	9	5,010	7
Plant operator-warehouseman	2,173	12	2,551	15	1,571	15	4,457	19	625	15	11,377	16
Shuttle car-tram operator	13	0	22	0	58	1	96	0	24	1	213	0
Stone cutter-finisher	253	1	364	2	0	0	248	1	0	0	864	1
Truck driver	3,734	20	2,685	16	1,043	10	1,153	5	194	5	8,808	12
Total	18,511	100	17,215	100	10,145	100	23,219	100	4,266	100	73,357	100

¹MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

²As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-2.—Stone mining 1986 workforce estimates:¹ principal equipment operated, by employment size class²

Equipment operated grouping ³	1-19		20-49		50-99		100-249		250-999		Total	
	Workers	pct										
Backhoe-crane-dragline-shovel	706	4	586	4	389	4	464	2	83	2	2,228	3
Belt	74	0	56	0	31	0	168	1	74	2	404	1
Dozer-heavy and mobile equipment	476	3	454	3	178	2	440	2	68	2	1,616	2
Drill (underground)-rock bolter	238	1	147	1	34	0	66	0	0	0	485	1
Drill (surface)	834	5	607	4	139	1	268	1	50	1	1,898	3
Explosives	120	1	145	1	20	0	47	0	0	0	332	0
Front-end loader-forklift	3,079	18	1,887	12	802	9	1,488	7	282	7	7,538	11
Grader-scraper	127	1	95	1	105	1	100	0	0	0	427	1
Handtools (powered and nonpowered)	1,052	6	2,004	12	1,581	17	4,799	22	934	24	10,370	15
Hoist-elevator	0	0	0	0	6	0	30	0	0	0	36	0
Many equipment	345	2	179	1	59	1	81	0	20	1	684	1
Miscellaneous utility equipment	998	6	986	6	841	9	2,307	11	290	7	5,423	8
Plant equipment	2,268	13	2,362	15	1,208	13	2,815	13	452	12	9,105	13
Pump	0	0	74	0	34	0	61	0	0	0	168	0
Scale-lab equipment-controls	489	3	609	4	473	5	1,567	7	178	5	3,316	5
Shuttle car-locomotive	13	0	48	0	71	1	154	1	26	1	312	0
Stone cutting-finishing machine	291	2	330	2	0	0	248	1	0	0	868	1
Truck (haulage)	3,813	22	2,745	17	1,059	11	1,238	6	263	7	9,119	13
Truck (utility)-personnel carrier	145	1	146	1	45	0	294	1	360	9	989	1
Welding machine-lathe	381	2	581	4	603	6	1,058	5	281	7	2,904	4
None	1,663	10	2,019	12	1,572	17	3,517	16	464	12	9,235	14
Not elsewhere classified	13	0	53	0	40	0	87	0	0	0	193	0
Unspecified	31	0	138	1	51	1	411	2	65	2	695	1
Total	17,157	100	16,248	100	9,341	100	21,709	100	3,891	100	68,347	100

¹Excluding job title category of office workers.

²MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

³See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-3.—Stone mining 1986 workforce estimates: work location at mine, by employment size class¹

Work location	1-19		20-49		50-99		100-249		250-999		Total	
	Workers	pct										
Underground mine	333	2	273	2	165	2	324	1	0	0	1,094	1
Surface at underground mine	182	1	253	1	140	1	83	0	0	0	658	1
Surface mine	12,852	69	9,949	58	4,315	43	7,519	32	1,106	26	35,742	49
Plant or mill	3,247	18	5,053	29	4,343	43	13,210	57	2,694	63	28,546	39
Office	1,897	10	1,688	10	1,182	12	2,083	9	465	11	7,316	10
Total	18,511	100	17,215	100	10,145	100	23,219	100	4,266	100	73,357	100

¹MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-4.—Stone mining 1986 workforce estimates:¹ experience at job, company, and mining, by employment size class²

Experience, yr	1-19		20-49		50-99		100-249		250-999		Total	
	Workers	pct										
At present job:												
0< to ≤1	3,731	22	3,367	21	1,929	21	3,306	15	733	19	13,067	19
1< to ≤2	2,114	12	1,959	12	1,292	14	2,580	12	420	11	8,365	12
2< to ≤3	1,626	9	1,218	7	832	9	2,051	9	458	12	6,185	9
3< to ≤5	2,007	12	1,765	11	1,200	13	3,044	14	375	10	8,392	12
5< to ≤10	2,901	17	3,238	20	1,912	20	5,190	24	971	25	14,212	21
10< to ≤20	2,375	14	2,689	17	951	10	2,971	14	716	18	9,702	14
20<	1,098	6	1,241	8	532	6	789	4	153	4	3,814	6
Unspecified	1,304	8	770	5	692	7	1,778	8	67	2	4,611	7
Total	17,157	100	16,248	100	9,341	100	21,709	100	3,891	100	68,347	100
Median yr.	4	NAp	5	NAp	4	NAp	5	NAp	5	NAp	5	NAp
At present company:												
0< to ≤1	3,221	19	2,847	18	1,247	13	1,294	6	132	3	8,741	13
1< to ≤5	5,600	33	4,187	26	2,823	30	3,615	17	276	7	16,500	24
5< to ≤10	3,194	19	3,091	19	2,069	22	5,103	24	824	21	14,282	21
10< to ≤15	1,883	11	2,116	13	902	10	3,784	17	584	15	9,269	14
15< to ≤20	1,093	6	1,573	10	758	8	2,593	12	654	17	6,670	10
20< to ≤25	571	3	682	4	471	5	1,278	6	549	14	3,550	5
25< to ≤30	377	2	666	4	316	3	1,217	6	291	7	2,867	4
30<	558	3	665	4	536	6	1,828	8	538	14	4,126	6
Unspecified	661	4	422	3	218	2	997	5	44	1	2,343	3
Total	17,157	100	16,248	100	9,341	100	21,709	100	3,891	100	68,347	100
Median yr.	5	NAp	7	NAp	6	NAp	11	NAp	16	NAp	8	NAp
Total mining:												
0< to ≤1	2,331	14	2,230	14	864	9	1,051	5	102	3	6,577	10
1< to ≤5	4,232	25	3,312	20	1,910	20	2,687	12	195	5	12,337	18
5< to ≤10	3,150	18	2,892	18	2,190	23	4,938	23	781	20	13,951	20
10< to ≤15	2,008	12	2,164	13	1,095	12	3,720	17	513	13	9,500	14
15< to ≤20	1,243	7	1,634	10	790	8	2,704	12	624	16	6,994	10
20< to ≤25	718	4	718	4	632	7	1,369	6	519	13	3,955	6
25< to ≤30	452	3	809	5	355	4	1,159	5	261	7	3,037	4
30<	664	4	709	4	547	6	1,816	8	534	14	4,269	6
Unspecified	2,360	14	1,781	11	958	10	2,265	10	363	9	7,727	11
Total	17,157	100	16,248	100	9,341	100	21,709	100	3,891	100	68,347	100
Median yr.	7	NAp	8	NAp	8	NAp	12	NAp	17	NAp	9	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

²MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-5.—Stone mining 1986 workforce estimates:¹ training received, by employment size class²

Job training for last 2 yr, h	1-19		20-49		50-99		100-249		250-999		Total	
	Workers	pct										
0	1,519	9	990	6	994	11	1,650	8	21	1	5,175	8
1-8	1,269	7	1,407	9	999	11	1,595	7	609	16	5,879	9
9-15	714	4	297	2	246	3	1,788	8	183	5	3,230	5
16	2,483	14	3,425	21	1,239	13	3,663	17	823	21	11,632	17
17-40	2,263	13	2,730	17	1,540	16	2,811	13	640	16	9,985	15
41-80	1,781	10	1,327	8	578	6	1,501	7	367	9	5,554	8
81-160	871	5	588	4	207	2	1,692	8	163	4	3,522	5
161+	500	3	440	3	384	4	1,118	5	46	1	2,488	4
Unspecified	5,758	34	5,044	31	3,153	34	5,889	27	1,039	27	20,883	31
Total	17,157	100	16,248	100	9,341	100	21,709	100	3,891	100	68,347	100
Mean job training	h.	46	NAp	41	NAp	54	NAp	56	NAp	33	NAp	48

NAP Not applicable.

¹Excluding job title category of office workers.²MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-6.—Stone mining 1986 workforce estimates:¹ age distribution, by employment size class²

Age, yr	1-19		20-49		50-99		100-249		250-999		Total	
	Workers	pct										
15-20	486	3	320	2	222	2	192	1	0	0	1,220	2
21-23	1,129	7	1,020	6	519	6	520	2	26	1	3,214	5
24-26	1,571	9	1,394	9	785	8	1,090	5	151	4	4,992	7
27-29	1,505	9	1,556	10	990	11	1,639	8	314	8	6,005	9
30-34	2,503	15	2,433	15	1,404	15	3,219	15	428	11	9,988	15
35-39	1,941	11	1,923	12	1,377	15	3,686	17	532	14	9,458	14
40-49	3,260	19	3,352	21	1,970	21	5,458	25	1,209	31	15,250	22
50+	3,709	22	3,926	24	1,996	21	5,619	26	1,216	31	16,466	24
Unspecified	1,053	6	323	2	77	1	286	1	15	0	1,754	3
Total	17,157	100	16,248	100	9,341	100	21,709	100	3,891	100	68,347	100
Mean age	yr.	39	NAp	39	NAp	39	NAp	41	NAp	43	NAp	40

NAP Not applicable.

¹Excluding job title category of office workers.²MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-7.—Stone mining 1986 workforce estimates:¹ sex, race, and education, by employment size class²

	1-19		20-49		50-99		100-249		250-999		Total	
	Workers	pct										
Sex:												
Male	16,644	97	15,664	96	9,104	97	21,088	97	3,825	98	66,326	97
Female	321	2	359	2	220	2	556	3	34	1	1,490	2
Unspecified	192	1	225	1	16	0	65	0	32	1	531	1
Total	17,157	100	16,248	100	9,341	100	21,709	100	3,891	100	68,347	100
Race:												
White	14,906	87	13,526	83	7,458	80	17,066	79	3,214	83	56,171	82
Black	683	4	1,144	7	927	10	2,191	10	174	4	5,119	7
Hispanic	981	6	1,061	7	732	8	2,143	10	436	11	5,353	8
Other	404	2	213	1	216	2	222	1	46	1	1,101	2
Unspecified	183	1	303	2	8	0	88	0	21	1	603	1
Total	17,157	100	16,248	100	9,341	100	21,709	100	3,891	100	68,347	100
Education level:												
Some elementary	1,981	12	1,774	11	790	8	1,606	7	198	5	6,349	9
Some high school	3,671	21	3,638	22	1,744	19	3,388	16	628	16	13,068	19
High school diploma	8,324	49	7,219	44	3,912	42	9,992	46	1,924	49	31,371	46
Vocational diploma	938	5	908	6	723	8	1,785	8	165	4	4,520	7
Some college	840	5	821	5	735	8	2,220	10	504	13	5,120	7
College degree	283	2	376	2	417	4	1,236	6	237	6	2,549	4
Unspecified	1,121	7	1,512	9	1,020	11	1,482	7	235	6	5,370	8
Total	17,157	100	16,248	100	9,341	100	21,709	100	3,891	100	68,347	100

¹Excluding job title category of office workers.²MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-8.—Stone mining 1986 workforce estimates: job title, by principal equipment operated¹, number of workers

Job title grouping ²	Backhoe crane dragline shovel	Belt	Dozer heavy and mobile equipment	Drill (under-ground) rock bolter	Drill (surface)	Explosives	Front-end loader forklift	Grader scraper	Handtools (powered and non-powered)
Backhoe-crane-dragline-shovel operator.....	2,089	0	0	0	0	0	15	0	0
Beltman-belt repairman.....	0	300	0	0	0	0	0	0	0
Blaster.....	0	0	0	0	0	303	0	0	0
Deckhand-barge and dredge operator.....	0	0	0	0	0	0	0	0	26
Dozer-heavy and mobile equipment operator..	32	0	1,422	8	0	0	224	0	0
Driller-rock bolter.....	0	0	0	295	1,702	17	8	0	6
Electrician-lampman.....	0	0	0	0	0	0	0	0	1,433
Front-end loader-forklift operator.....	0	0	25	0	0	0	6,044	0	0
Grader-scraper operator.....	0	0	0	0	0	0	0	415	0
Laborer-miner-utility man.....	28	23	101	168	164	6	661	7	254
Manager-foreman-supervisor:									
General.....	25	0	18	0	6	0	74	6	0
Maintenance.....	0	0	0	0	0	0	0	0	0
Working.....	0	0	38	0	7	6	66	0	7
Mechanic-welder-oiler-machinist.....	0	0	0	0	0	0	0	0	8,530
Mine technical support.....	15	0	0	0	0	0	6	0	52
Office worker.....	0	0	0	0	0	0	0	0	0
Plant operator-warehouseman.....	39	82	12	0	20	0	433	0	62
Shuttle car-tram operator.....	0	0	0	0	0	0	0	0	0
Stone cutter-finisher.....	0	0	0	13	0	0	6	0	0
Truck driver.....	0	0	0	0	0	0	0	0	0
Total.....	2,228	404	1,616	485	1,898	332	7,538	427	10,370
	Hoist elevator	Many equipment	Miscellaneous utility equipment	Plant equipment	Pump	Scale-lab equipment controls	Shuttle car locomotive	Stone cutting finishing machine	Truck (haulage)
Backhoe-crane-dragline-shovel operator.....	0	7	0	0	0	0	0	0	0
Beltman-belt repairman.....	0	0	0	13	7	0	0	0	0
Blaster.....	0	0	0	0	0	0	0	0	0
Deckhand-barge and dredge operator.....	0	0	0	63	0	0	0	0	0
Dozer-heavy and mobile equipment operator..	0	0	0	0	0	0	0	0	89
Driller-rock bolter.....	0	0	0	0	0	0	0	0	0
Electrician-lampman.....	0	0	0	0	0	0	0	0	0
Front-end loader-forklift operator.....	0	25	0	0	0	0	0	0	0
Grader-scraper operator.....	0	0	0	0	0	0	0	0	0
Laborer-miner-utility man.....	5	428	5,423	317	122	15	59	51	197
Manager-foreman-supervisor:									
General.....	0	194	0	104	0	0	0	0	12
Maintenance.....	0	0	0	0	0	0	0	0	0
Working.....	0	11	0	90	0	25	7	6	0
Mechanic-welder-oiler-machinist.....	0	0	0	8	0	2	0	0	0
Mine technical support.....	25	0	0	7	17	2,872	0	0	0
Office worker.....	0	0	0	0	0	13	0	0	0
Plant operator-warehouseman.....	0	13	0	8,503	24	401	76	7	13
Shuttle car-tram operator.....	6	0	0	0	0	0	171	0	7
Stone cutter-finisher.....	0	0	0	0	0	0	0	804	0
Truck driver.....	0	7	0	0	0	0	0	0	8,801
Total.....	36	-	684	5,423	9,105	168	3,328	312	868
									9,119

See explanatory notes at end of table.

Table E-8.—Stone mining 1986 workforce estimates: job title, by principal equipment operated,¹ number of workers—Con.

Job title grouping ²	Truck (utility) personnel carrier	Welding machine-lathe	None	Not elsewhere classified	Unspecified	Total
Backhoe-crane-dragline-shovel operator	0	0	7	0	0	2,118
Beltman-belt repairman	0	0	0	0	0	319
Blaster	0	0	32	0	0	336
Deckhand-barge and dredge operator	0	0	0	0	82	171
Dozer-heavy and mobile equipment operator	0	0	0	0	0	1,775
Driller-rock bolter	10	0	13	7	0	2,058
Electrician-lampman	0	0	0	0	0	1,433
Front-end loader-forklift operator	0	0	0	0	0	6,095
Grader-scrapers operator	0	0	0	0	0	415
Laborer-miner-utility man	402	0	233	48	61	8,771
Manager-foreman-supervisor:						
General	84	0	4,021	0	0	4,543
Maintenance	93	0	615	0	0	708
Working	124	0	1,976	0	0	2,362
Mechanic-welder-oiler-machinist	20	2,898	0	0	0	11,458
Mine technical support	147	0	1,298	40	46	4,524
Office worker	60	0	4,935	3	0	5,010
Plant operator-warehouseman	98	7	996	86	507	11,377
Shuttle car-tram operator	11	0	5	13	0	213
Stone cutter-finisher	0	0	40	0	0	864
Truck driver	0	0	0	0	0	8,808
Total	1,049	2,904	14,170	196	695	73,357

¹See appendix B for detailed explanation of equipment operated grouping.²As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-9.—Stone mining 1986 workforce estimates: job title, by work location at mine, number of workers

Job title grouping ¹	Underground mine	Surface at underground mine	Surface mine	Plant or mill	Office	Total
Backhoe-crane-dragline-shovel operator	10	23	1,814	270	0	2,118
Beltman-belt repairman	0	8	87	223	0	319
Blaster	85	0	244	7	0	336
Deckhand-barge and dredge operator	0	0	124	46	0	171
Dozer-heavy and mobile equipment operator	0	55	1,506	215	0	1,775
Driller-rock bolter	244	13	1,767	33	0	2,058
Electrician-lampman	13	7	383	1,030	0	1,433
Front-end loader-forklift operator	98	72	4,796	1,129	0	6,095
Grader-scrapers operator	18	7	370	20	0	415
Laborer-miner-utility man	106	70	4,823	3,771	0	8,771
Manager-foreman-supervisor:						
General	72	50	2,900	1,291	231	4,543
Maintenance	25	0	227	439	18	708
Working	50	15	802	1,461	34	2,362
Mechanic-welder-oiler-machinist	126	123	5,265	5,944	0	11,458
Mine technical support	5	73	849	1,840	1,757	4,524
Office worker	0	0	0	0	5,010	5,010
Plant operator-warehouseman	35	56	1,721	9,298	267	11,377
Shuttle car-tram operator	8	0	109	96	0	213
Stone cutter-finisher	0	0	329	535	0	864
Truck driver	198	87	7,624	899	0	8,808
Total	1,094	658	35,742	28,546	7,316	73,357

¹As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-10.—Stone mining 1986 workforce estimates: job title, by years of experience at job

Job title grouping ¹	0< to ≤1	1< to ≤2	2< to ≤3	3< to ≤5	5< to ≤10	10< to ≤20	20<	Unspecified	Total	Median, yr
Backhoe-crane-dragline-shovel operator	318	257	244	234	434	338	203	89	2,118	5
Beltman-belt repairman	121	18	41	12	71	37	19	0	319	3
Blaster	37	38	47	32	113	46	10	13	336	6
Deckhand-barge and dredge operator	46	32	28	49	15	0	0	0	171	3
Dozer-heavy and mobile equipment operator	256	255	148	251	348	252	108	158	1,775	5
Driller-rock bolter	413	270	150	194	491	299	88	154	2,058	4
Electrician-lampman	206	131	176	203	354	193	123	47	1,433	5
Front-end loader-forklift operator	988	687	591	757	1,254	935	496	387	6,095	5
Grader-scrapers operator	144	20	64	63	79	36	0	9	415	3
Laborer-miner-utility man	2,672	1,287	710	989	1,402	844	277	591	8,771	3
Manager-foreman-supervisor:										
General	366	403	278	456	1,012	1,087	591	349	4,543	8
Maintenance	158	72	57	87	239	59	11	24	708	5
Working	372	211	179	258	564	499	171	109	2,362	6
Mechanic-welder-oiler-machinist	1,828	1,371	1,118	1,272	2,914	1,658	564	733	11,458	5
Mine technical support	783	507	494	671	1,056	603	191	219	4,524	5
Office worker	785	548	439	513	1,139	818	442	325	5,010	6
Plant operator-warehouseman	2,272	1,553	1,041	1,657	2,174	1,457	481	741	11,377	4
Shuttle car-tram operator	26	43	42	26	27	35	8	5	213	3
Stone cutter-finisher	156	45	38	113	141	110	72	189	864	5
Truck driver	1,906	1,164	740	1,068	1,524	1,216	397	794	8,808	4
Total	13,852	8,913	6,624	8,904	15,351	10,521	4,255	4,936	73,357	5

¹As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-11.—Stone mining 1986 workforce estimates: job title, by years of experience at company

Job title grouping ¹	0< to ≤1	1< to ≤5	5< to ≤10	10< to ≤15	15< to ≤20	20<	25< to ≤30	30<	Unspecified	Total	Median, yr
Backhoe-crane-dragline-shovel operator	204	607	447	195	257	103	80	189	35	2,118	8
Beltman-belt repairman	62	43	62	92	17	0	24	13	6	319	8
Blaster	31	109	95	56	20	8	17	0	0	336	6
Deckhand-barge and dredge operator	13	38	33	31	10	0	0	0	46	171	8
Dozer-heavy and mobile equipment operator	170	436	290	293	128	153	63	108	135	1,775	9
Driller-rock bolter	339	555	496	240	211	74	52	35	56	2,058	7
Electrician-lampman	107	307	316	173	187	147	31	123	42	1,433	10
Front-end loader-forklift operator	734	1,609	1,285	781	551	292	237	404	201	6,095	7
Grader-scrapers operator	119	129	86	12	46	7	10	7	0	415	4
Laborer-miner-utility man	1,930	2,297	1,824	1,004	501	347	199	287	383	8,771	5
Manager-foreman-supervisor:											
General	175	717	770	882	619	348	306	582	144	4,543	14
Maintenance	34	130	169	115	78	31	87	53	11	708	11
Working	139	334	460	373	323	255	168	258	52	2,362	13
Mechanic-welder-oiler-machinist	1,230	2,363	2,648	1,700	1,254	606	485	685	488	11,458	9
Mine technical support	466	1,198	1,032	551	457	260	185	286	88	4,524	8
Office worker	605	1,284	1,172	723	322	286	224	236	156	5,010	7
Plant operator-warehouseman	1,211	2,562	2,407	1,692	1,287	642	493	742	341	11,377	9
Shuttle car-tram operator	26	32	44	62	27	0	5	17	0	213	11
Stone cutter-finisher	123	198	172	92	13	39	96	68	63	864	7
Truck driver	1,627	2,837	1,646	924	683	238	329	270	254	8,808	5
Total	9,346	17,785	15,454	9,992	6,992	3,837	3,091	4,362	2,499	73,357	8

¹As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-12.—Stone mining 1986 workforce estimates: job title, by years of mining experience

Job title grouping ¹	0< to ≤1	1< to ≤5	5< to ≤10	10< to ≤15	15< to ≤20	20< to ≤25	25< to ≤30	30< Unspeci-fied	Total	Median, yr
Backhoe-crane-dragline-shovel operator	160	380	448	249	265	146	96	190	183	2,118
Beltman-belt repairman	56	25	62	92	11	0	24	13	36	319
Blaster	25	75	69	63	20	8	17	0	60	336
Deckhand-barge and dredge operator	7	38	57	53	10	0	0	0	7	171
Dozer-heavy and mobile equipment operator	62	418	302	273	183	184	82	120	152	1,775
Driller-rock bolter	226	430	433	294	211	99	90	47	228	2,058
Electrician-lampman	71	240	350	160	199	141	31	123	117	1,433
Front-end loader-forklift operator	457	1,139	1,364	878	639	308	243	455	612	6,095
Grader-scraper operator	100	72	82	20	46	15	10	7	64	415
Laborer-miner-utility man	1,523	1,928	1,814	964	534	369	196	290	1,154	8,771
Manager-foreman-supervisor:										
General	75	291	653	839	631	431	391	682	550	4,543
Maintenance	6	76	129	125	86	54	76	46	110	708
Working	64	133	444	407	336	271	183	258	265	2,362
Mechanic-welder-oiler-machinist	956	1,860	2,598	1,793	1,305	653	519	695	1,079	11,458
Mine technical support	380	919	951	573	470	285	207	291	449	4,524
Office worker	426	970	1,084	707	348	292	214	286	683	5,010
Plant operator-warehouseman	884	1,866	2,472	1,658	1,299	700	485	744	1,267	11,377
Shuttle car-tram operator	13	32	51	55	33	0	5	17	7	213
Stone cutter-finisher	105	122	72	89	7	39	26	20	384	864
Truck driver	1,408	2,292	1,600	915	710	251	356	270	1,006	8,808
Total	7,003	13,307	15,035	10,207	7,342	4,247	3,250	4,555	8,409	73,357

¹As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-13.—Stone mining 1986 workforce estimates: job title, by hours of training received in last 2 years

Job title grouping ¹	0	1-8	9-15	16	17-40	41-80	81-160	161+	Unspeci-fied	Total	Mean, hr
Backhoe-crane-dragline-shovel operator	157	145	103	354	287	172	89	63	747	2,118	49
Beltman-belt repairman	32	58	12	87	12	12	0	7	100	319	22
Blaster	13	24	6	106	41	31	30	19	65	336	65
Deckhand-barge and dredge operator	13	5	0	23	44	0	20	7	59	171	54
Dozer-heavy and mobile equipment operator	106	138	99	463	218	93	56	63	540	1,775	39
Driller-rock bolter	184	123	73	471	221	230	82	65	611	2,058	47
Electrician-lampman	160	127	92	212	171	69	125	105	371	1,433	82
Front-end loader-forklift operator	425	503	208	1,007	958	523	342	161	1,968	6,095	47
Grader-scraper operator	61	58	10	60	36	39	0	15	136	415	41
Laborer-miner-utility man	618	786	529	1,354	1,183	710	403	360	2,828	8,771	44
Manager-foreman-supervisor:											
General	428	236	137	795	536	406	316	145	1,544	4,543	51
Maintenance	27	104	12	79	123	124	43	15	182	708	47
Working	183	171	60	373	469	277	103	100	626	2,362	59
Mechanic-welder-oiler-machinist	677	880	705	2,062	1,917	729	529	579	3,381	11,458	60
Mine technical support	423	295	219	599	678	365	322	154	1,469	4,524	48
Office worker	782	374	146	307	495	333	225	177	2,172	5,010	53
Plant operator-warehouseman	933	1,088	576	1,901	1,712	973	661	365	3,169	11,377	43
Shuttle car-tram operator	13	38	0	58	15	18	0	18	52	213	74
Stone cutter-finisher	139	184	30	13	51	40	12	6	389	864	24
Truck driver	581	917	358	1,616	1,313	743	390	243	2,647	8,808	39
Total	5,957	6,252	3,376	11,939	10,480	5,887	3,746	2,665	23,055	73,357	49

¹As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-14.—Stone mining 1986 workforce estimates: job title, by years of age

Job title grouping ¹	15-20	21-23	24-26	27-29	30-34	35-39	40-49	50+	Unspecified	Total	Mean, yr
Backhoe-crane-dragline-shovel operator	37	75	207	151	250	198	449	713	38	2,118	42
Beltman-belt repairman	13	7	12	69	33	41	59	85	0	319	39
Blaster	7	18	24	33	83	17	66	75	13	336	39
Deckhand-barge and dredge operator	0	7	18	13	35	44	38	15	0	171	36
Dozer-heavy and mobile equipment operator	7	31	62	97	321	246	443	537	31	1,775	43
Driller-rock bolter	56	79	159	219	345	211	398	502	89	2,058	39
Electrician-lampman	0	44	23	116	237	309	400	294	11	1,433	41
Front-end loader-forklift operator	148	237	410	509	875	858	1,247	1,519	292	6,095	40
Grader-scrapers operator	40	32	40	66	40	45	79	74	0	415	36
Laborer-miner-utility man	333	828	1,022	1,021	1,478	1,070	1,482	1,285	252	8,771	36
Manager-foreman-supervisor:											
General	6	22	95	177	418	605	1,393	1,718	110	4,543	46
Maintenance	0	6	7	0	79	108	258	229	21	708	45
Working	6	17	59	98	289	401	708	762	21	2,362	44
Mechanic-welder-oiler-machinist	134	288	656	1,060	1,656	1,916	2,886	2,622	240	11,458	41
Mine technical support	35	217	290	370	625	691	1,068	1,136	92	4,524	41
Office worker	47	175	264	425	709	719	1,211	1,346	115	5,010	41
Plant operator-warehouseman	158	493	920	1,089	1,705	1,582	2,379	2,817	234	11,377	40
Shuttle car-tram operator	0	7	6	13	31	29	74	40	13	213	41
Stone cutter-finisher	13	66	56	96	108	100	212	213	0	864	40
Truck driver	230	742	927	809	1,380	988	1,609	1,828	295	8,808	38
Total	1,267	3,389	5,255	6,430	10,697	10,177	16,461	17,812	1,869	73,357	40

¹As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-15.—Stone mining 1986 workforce estimates: job title, by sex

Job title grouping ¹	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel operator	2,105	3	6	0	6	1	2,118	3
Beltman-belt repairman	302	0	17	0	0	0	319	0
Blaster	336	0	0	0	0	0	336	0
Deckhand-barge and dredge operator	155	0	15	0	0	0	171	0
Dozer-heavy and mobile equipment operator	1,761	3	8	0	7	1	1,775	2
Driller-rock bolter	1,998	3	8	0	51	9	2,058	3
Electrician-lampman	1,433	2	0	0	0	0	1,433	2
Front-end loader-forklift operator	6,030	9	13	0	52	9	6,095	8
Grader-scrapers operator	415	1	0	0	0	0	415	1
Laborer-miner-utility man	8,433	12	206	5	132	23	8,771	12
Manager-foreman-supervisor:								
General	4,500	7	18	0	25	4	4,543	6
Maintenance	708	1	0	0	0	0	708	1
Working	2,344	3	12	0	7	1	2,362	3
Mechanic-welder-oiler-machinist	11,347	17	55	1	57	10	11,458	16
Mine technical support	3,715	5	802	19	7	1	4,524	6
Office worker	2,323	3	2,652	64	35	6	5,010	7
Plant operator-warehouseman	11,100	16	200	5	78	14	11,377	16
Shuttle car-tram operator	191	0	22	1	0	0	213	0
Stone cutter-finisher	858	1	6	0	0	0	864	1
Truck driver	8,597	13	102	2	109	19	8,808	12
Total	68,649	100	4,142	100	565	100	73,357	100

¹As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-16.—Stone mining 1986 workforce estimates: job title, by race

Job title grouping ¹	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel operator	1,762	3	174	3	133	2	29	2	20	3	2,118	3
Beltman-belt repairman	289	0	18	0	13	0	0	0	0	0	319	0
Blaster	301	0	6	0	20	0	8	1	0	0	336	0
Deckhand-barge and dredge operator	112	0	59	1	0	0	0	0	0	0	171	0
Dozer-heavy and mobile equipment operator	1,451	2	155	3	104	2	59	5	7	1	1,775	2
Driller-rock bolter	1,699	3	182	4	79	1	40	3	58	9	2,058	3
Electrician-lampman	1,247	2	43	1	137	3	7	1	0	0	1,433	2
Front-end loader-forklift operator	5,057	8	425	8	458	8	108	9	46	7	6,095	8
Grader-scraper operator	329	1	12	0	73	1	0	0	0	0	415	1
Laborer-miner-utility man	6,025	10	1,256	24	1,207	22	169	14	114	17	8,771	12
Manager-foreman-supervisor:												
General	4,265	7	103	2	97	2	60	5	19	3	4,543	6
Maintenance	638	1	21	0	36	1	7	1	7	1	708	1
Working	2,201	4	98	2	44	1	7	1	13	2	2,362	3
Mechanic-welder-oiler-machinist	9,617	16	579	11	923	17	269	23	71	11	11,458	16
Mine technical support	3,997	7	129	2	337	6	36	3	24	4	4,524	6
Office worker	4,677	8	88	2	107	2	82	7	56	9	5,010	7
Plant operator-warehouseman	9,118	15	1,059	20	945	17	163	14	92	14	11,377	16
Shuttle car-tram operator	146	0	34	1	33	1	0	0	0	0	213	0
Stone cutter-finisher	648	1	186	4	18	0	6	1	6	1	864	1
Truck driver	7,269	12	581	11	697	13	133	11	128	19	8,808	12
Total	60,848	100	5,207	100	5,460	100	1,183	100	659	100	73,357	100

¹As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-17.—Stone mining 1986 workforce estimates: job title, by education

Job title grouping ¹	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel operator	308	15	661	31	876	41	84	4	58	3	15	1	117	6	2,118	3
Beltman-belt repairman	13	4	115	36	136	43	8	3	34	11	0	0	13	4	319	0
Blaster	56	17	56	17	155	46	25	7	42	13	0	0	0	0	336	0
Deckhand-barge and dredge operator	7	4	15	9	114	67	20	11	0	0	15	9	0	0	171	0
Dozer-heavy and mobile equipment operator	228	13	448	25	829	47	73	4	73	4	0	0	125	7	1,775	2
Driller-rock bolter	227	11	570	28	811	39	158	8	106	5	3	0	184	9	2,058	3
Electrician-lampman	14	1	91	6	480	33	451	31	204	14	79	5	116	8	1,433	2
Front-end loader-forklift operator	707	12	1,424	23	2,979	49	254	4	194	3	44	1	494	8	6,095	8
Grader-scraper operator	37	9	94	23	169	41	14	3	15	4	0	0	86	21	415	1
Laborer-miner-utility man	1,047	12	1,629	19	4,141	47	438	5	540	6	156	2	820	9	8,771	12
Manager-foreman-supervisor:																
General	260	6	450	10	1,878	41	253	6	637	14	695	15	370	8	4,543	6
Maintenance	52	7	51	7	261	37	42	6	140	20	126	18	36	5	708	1
Working	147	6	244	10	1,081	46	154	7	369	16	249	11	120	5	2,362	3
Mechanic-welder-oiler-machinist	975	9	1,945	17	5,163	45	1,439	13	812	7	98	1	1,026	9	11,458	16
Mine technical support	164	4	425	9	1,940	43	238	5	707	16	786	17	264	6	4,524	6
Office worker	12	0	109	2	1,899	38	325	6	1,361	27	1,086	22	217	4	5,010	7
Plant operator-warehouseman	1,036	9	2,261	20	5,633	50	528	5	944	8	219	2	757	7	11,377	16
Shuttle car-tram operator	8	4	42	20	121	57	7	3	13	6	7	3	15	7	213	0
Stone cutter-finisher	120	14	315	36	374	43	6	1	19	2	6	1	24	3	864	1
Truck driver	945	11	2,234	25	4,232	48	328	4	213	2	53	1	803	9	8,808	12
Total	6,362	9	13,177	18	33,269	45	4,845	7	6,481	9	3,635	5	5,587	8	73,357	100

¹As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-18.—Stone mining 1986 workforce estimates:¹ principal equipment operated, by years of experience at job

Equipment operated grouping ²	0< to ≤1	1< to ≤2	2< to ≤3	3< to ≤5	5< to ≤10	10< to ≤20	20<	Unspecified	Total	Median, yr
Backhoe-crane-dragline-shovel	341	264	249	261	447	361	219	86	2,228	5
Belt	146	25	47	19	78	64	26	0	404	3
Dozer-heavy and mobile equipment	269	211	139	196	317	221	100	163	1,616	5
Drill (underground)-rock bolter	134	116	19	91	49	51	13	13	485	2
Drill (surface)	391	218	134	153	479	279	103	141	1,898	5
Explosives	48	38	47	37	100	39	10	13	332	5
Front-end loader-forklift	1,280	876	713	1,041	1,596	1,099	529	404	7,538	5
Grader-scraper	144	20	64	63	85	36	7	9	427	3
Handtools (powered and nonpowered)	1,639	1,187	1,081	1,190	2,647	1,403	550	673	10,370	5
Hoist-elevator	6	0	0	22	0	8	0	0	36	5
Many equipment	73	73	71	38	107	154	41	127	684	7
Miscellaneous utility equipment	1,692	752	445	633	890	388	199	424	5,423	3
Plant equipment	1,947	1,239	790	1,280	1,614	1,258	380	597	9,105	4
Pump	57	28	22	13	30	19	0	0	168	2
Scale-lab equipment-controls	538	336	383	460	746	489	152	211	3,316	5
Shuttle car-locomotive	41	78	33	47	58	41	8	5	312	4
Stone cutting-finishing machine	180	51	44	106	134	104	52	195	888	5
Truck (haulage)	1,992	1,240	796	1,094	1,547	1,234	415	800	9,119	4
Truck (utility)-personnel carrier	198	106	99	86	287	127	53	34	989	5
Welding machine-lathe	476	386	240	336	718	497	132	119	2,904	5
None	1,244	1,025	704	1,099	2,120	1,744	812	487	9,235	6
Not elsewhere classified	77	7	0	32	54	13	0	11	193	4
Unspecified	153	90	66	94	110	72	12	99	695	3
Total	13,067	8,365	6,185	8,392	14,212	9,702	3,814	4,611	68,347	5

¹Excluding job title category of office workers.²See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-19.—Stone mining 1986 workforce estimates:¹ principal equipment operated, by hours of training received in last 2 years

Equipment operated grouping ²	0	1-8	9-15	16	17-40	41-80	81-160	161+	Unspecified	Total	Mean, h
Backhoe-crane-dragline-shovel	157	153	125	394	299	171	89	63	776	2,228	47
Belt	39	65	18	105	40	18	7	26	87	404	44
Dozer-heavy and mobile equipment	78	130	72	366	244	96	44	37	548	1,616	36
Drill (underground)-rock bolter	126	22	0	78	50	50	0	23	137	485	57
Drill (surface)	136	108	67	411	166	228	82	50	650	1,898	43
Explosives	7	19	13	106	44	36	24	19	65	332	67
Front-end loader-forklift	530	651	324	1,287	1,201	665	358	299	2,224	7,538	49
Grader-scraper	61	58	17	60	36	39	0	15	142	427	40
Handtools (powered and nonpowered)	660	825	592	1,816	1,693	587	621	643	2,933	10,370	67
Hoist-elevator	0	0	0	30	0	0	0	6	0	36	87
Many equipment	50	95	46	144	84	58	59	6	142	684	38
Miscellaneous utility equipment	381	479	314	789	631	364	278	161	2,026	5,423	41
Plant equipment	695	897	414	1,535	1,416	863	553	262	2,470	9,105	44
Pump	14	0	0	83	59	7	0	0	7	168	18
Scale-lab equipment-controls	310	175	187	428	537	291	220	88	1,080	3,316	43
Shuttle car-locomotive	13	38	7	84	56	26	24	12	51	312	54
Stone cutting-finishing machine	132	144	30	13	44	46	25	44	389	868	53
Truck (haulage)	616	953	381	1,702	1,346	743	397	243	2,737	9,119	38
Truck (utility)-personnel carrier	73	107	55	155	204	153	49	46	148	989	48
Welding machine-lathe	215	205	217	498	453	237	94	88	898	2,904	47
None	808	691	314	1,425	1,292	816	562	332	2,994	9,235	52
Not elsewhere classified	43	7	5	18	31	13	7	7	63	193	33
Unspecified	31	58	31	104	61	46	30	18	317	695	39
Total	5,175	5,879	3,230	11,632	9,985	5,554	3,522	2,488	20,883	68,347	48

¹Excluding job title category of office workers.²See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-20.—Stone mining 1986 workforce estimates:¹ principal equipment operated, by years of age

Equipment operated grouping ²	15-20	21-23	24-26	27-29	30-34	35-39	40-49	50+	Unspeci-fied	Total	Mean, yr
Backhoe-crane-dragline-shovel	37	81	207	187	253	191	468	759	43	2,228	42
Belt	13	7	12	64	33	65	94	117	0	404	41
Dozer-heavy and mobile equipment	7	31	57	99	287	215	445	461	15	1,616	42
Drill (underground)-rock bolter	23	13	30	43	172	57	80	67	0	485	36
Drill (surface)	34	104	143	185	268	175	394	500	95	1,898	40
Explosives	12	13	24	24	76	22	67	68	26	332	39
Front-end loader-forklift	186	286	488	690	1,218	1,045	1,515	1,806	303	7,538	40
Grader-scraper	40	32	40	66	40	45	79	87	0	427	37
Handtools (powered and nonpowered)	80	305	483	971	1,637	1,804	2,625	2,268	196	10,370	40
Hoist-elevator	0	0	6	14	0	0	8	8	0	36	38
Many equipment	13	26	59	57	105	91	136	122	74	684	39
Miscellaneous utility equipment	210	485	725	711	912	644	858	718	159	5,423	35
Plant equipment	125	451	764	931	1,378	1,311	1,865	2,083	198	9,105	39
Pump	0	13	0	13	35	36	37	34	0	168	39
Scale-lab equipment-controls	26	156	249	254	421	555	804	790	60	3,316	40
Shuttle car-locomotive	0	7	13	13	51	50	93	86	0	312	42
Stone cutting-finishing machine	32	72	63	90	114	93	212	192	0	868	39
Truck (haulage)	230	780	955	822	1,427	1,048	1,675	1,881	302	9,119	38
Truck (utility)-personnel carrier	0	63	68	42	105	112	284	289	27	989	43
Welding machine-lathe	54	53	229	259	301	493	754	694	66	2,904	41
None	73	202	286	369	1,011	1,320	2,573	3,237	165	9,235	44
Not elsewhere classified	13	13	35	18	12	5	64	19	13	193	35
Unspecified	12	22	57	80	132	80	122	179	11	695	39
Total	1,220	3,214	4,992	6,005	9,988	9,458	15,250	16,466	1,754	68,347	40

¹Excluding job title category of office workers.²See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-21.—Stone mining 1986 workforce estimates:¹ principal equipment operated, by sex

Equipment operated grouping ²	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	2,216	3	6	0	6	1	2,228	3
Belt	388	1	17	1	0	0	404	1
Dozer-heavy and mobile equipment	1,616	2	0	0	0	0	1,616	2
Drill (underground)-rock bolter	470	1	8	1	7	1	485	1
Drill (surface)	1,834	3	0	0	63	12	1,898	3
Explosives	332	1	0	0	0	0	332	0
Front-end loader-forklift	7,429	11	38	3	72	13	7,538	11
Grader-scraper	427	1	0	0	0	0	427	1
Handtools (powered and nonpowered)	10,281	16	38	3	50	9	10,370	15
Hoist-elevator	36	0	0	0	0	0	36	0
Many equipment	684	1	0	0	0	0	684	1
Miscellaneous utility equipment	5,172	8	173	12	77	15	5,423	8
Plant equipment	8,935	13	81	5	89	17	9,105	13
Pump	168	0	0	0	0	0	168	0
Scale-lab equipment-controls	2,771	4	544	37	0	0	3,316	5
Shuttle car-locomotive	304	0	8	1	0	0	312	0
Stone cutting-finishing machine	862	1	6	0	0	0	868	1
Truck (haulage)	8,892	13	110	7	116	22	9,119	13
Truck (utility)-personnel carrier	981	1	8	1	0	0	989	1
Welding machine-lathe	2,875	4	23	2	7	1	2,904	4
None	8,834	13	369	25	32	6	9,235	14
Not elsewhere classified	173	0	20	1	0	0	193	0
Unspecified	644	1	39	3	12	2	695	1
Total	66,326	100	1,490	100	531	100	68,347	100

¹Excluding job title category of office workers.²See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-22.—Stone mining 1986 workforce estimates:¹ principal equipment operated, by race

Equipment operated grouping ²	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	1,861	3	180	4	138	3	29	3	20	3	2,228	3
Belt	357	1	18	0	30	1	0	0	0	0	404	1
Dozer-heavy and mobile equipment	1,323	2	151	3	82	2	59	5	0	0	1,616	2
Drill (underground)-rock bolter	416	1	44	1	13	0	0	0	13	2	485	1
Drill (surface)	1,514	3	214	4	85	2	40	4	45	7	1,898	3
Explosives	300	1	6	0	26	0	0	0	0	0	332	0
Front-end loader-forklift	6,180	11	565	11	633	12	95	9	66	11	7,538	11
Grader-scrapers	342	1	12	0	73	1	0	0	0	0	427	1
Handtools (powered and nonpowered)	8,679	15	590	12	839	16	191	17	71	12	10,370	15
Hoist-elevator	36	0	0	0	0	0	0	0	0	0	36	0
Many equipment	572	1	13	0	59	1	40	4	0	0	684	1
Miscellaneous utility equipment	3,558	6	900	18	794	15	98	9	73	12	5,423	8
Plant equipment	7,319	13	812	16	702	13	165	15	108	18	9,105	13
Pump	156	0	0	0	12	0	0	0	0	0	168	0
Scale-lab equipment-controls	2,958	5	90	2	225	4	31	3	11	2	3,316	5
Shuttle car-locomotive	183	0	52	1	65	1	13	1	0	0	312	0
Stone cutting-finishing machine	686	1	146	3	18	0	6	1	12	2	868	1
Truck (haulage)	7,497	13	602	12	758	14	133	12	128	21	9,119	13
Truck (utility)-personnel carrier	777	1	68	1	138	3	7	1	0	0	989	1
Welding machine-lathe	2,483	4	100	2	232	4	90	8	0	0	2,904	4
None	8,354	15	390	8	355	7	87	8	50	8	9,235	14
Not elsewhere classified	162	0	13	0	12	0	7	1	0	0	193	0
Unspecified	458	1	155	3	64	1	12	1	7	1	695	1
Total	56,171	100	5,119	100	5,353	100	1,101	100	603	100	68,347	100

¹Excluding job title category of office workers.²See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-23.—Stone mining 1986 workforce estimates:¹ principal equipment operated, by education

Equipment operated grouping ²	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	314	14	681	31	921	41	92	4	86	4	15	1	120	5	2,228	3
Belt	19	5	115	28	198	49	25	6	34	9	0	0	13	3	404	1
Dozer-heavy and mobile equipment	203	13	406	25	767	47	72	4	48	3	0	0	120	7	1,616	2
Drill (underground)-rock bolter	43	9	161	33	222	46	38	8	15	3	0	0	7	1	485	1
Drill (surface)	233	12	518	27	713	38	138	7	97	5	3	0	196	10	1,898	3
Explosives	50	15	68	20	147	44	25	8	42	13	0	0	0	0	332	0
Front-end loader-forklift	790	10	1,639	22	3,776	50	324	4	358	5	69	1	583	8	7,538	11
Grader-scrapers	44	10	94	22	175	41	14	3	15	3	0	0	86	20	427	1
Handtools (powered and nonpowered)	738	7	1,620	16	4,661	45	1,438	14	833	8	174	2	905	9	10,370	15
Hoist-elevator	0	0	8	23	12	32	8	23	8	23	0	0	0	0	36	0
Many equipment	28	4	120	18	269	39	31	4	63	9	30	4	144	21	684	1
Miscellaneous utility equipment	805	15	893	16	2,653	49	265	5	297	5	90	2	419	8	5,423	8
Plant equipment	892	10	2,020	22	4,347	48	394	4	636	7	146	2	670	7	9,105	13
Pump	19	11	58	35	51	31	7	4	27	16	7	4	0	0	168	0
Scale-lab equipment-controls	99	3	291	9	1,591	48	204	6	573	17	333	10	225	7	3,316	5
Shuttle car-locomotive	21	7	70	22	187	60	7	2	0	0	7	2	22	7	312	0
Stone cutting-finishing machine	120	14	288	33	393	45	6	1	25	3	6	1	30	3	868	1
Truck (haulage)	979	11	2,330	26	4,353	48	349	4	239	3	53	1	816	9	9,119	13
Truck (utility)-personnel carrier	106	11	157	16	508	51	28	3	75	8	78	8	38	4	989	1
Welding machine-lathe	260	9	455	16	1,182	41	473	16	243	8	22	1	270	9	2,904	4
None	533	6	928	10	3,785	41	523	6	1,338	14	1,490	16	639	7	9,235	14
Not elsewhere classified	6	3	47	24	77	40	26	14	37	19	0	0	0	0	193	0
Unspecified	48	7	102	15	385	55	33	5	31	5	28	4	69	10	695	1
Total	6,349	9	13,068	19	31,371	46	4,520	7	5,120	7	2,549	4	5,370	8	68,347	100

¹Excluding job title category of office workers.²See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-24.—Stone mining 1986 workforce estimates: job, company, and mining experience, by work location

Experience, yr	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total		
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	
At present job:													
0< to ≤1	223	20	67	10	7,167	20	5,195	18	1,201	16	13,852	19	
1< to ≤2	201	18	133	20	4,296	12	3,514	12	769	11	8,913	12	
2< to ≤3	128	12	58	9	3,107	9	2,649	9	682	9	6,624	9	
3< to ≤5	135	12	98	15	3,990	11	3,879	14	803	11	8,904	12	
5< to ≤10	175	16	122	18	7,114	20	6,351	22	1,590	22	15,351	21	
10< to ≤20	136	12	141	21	5,220	15	3,792	13	1,231	17	10,521	14	
20<	23	2	20	3	2,346	7	1,258	4	608	8	4,255	6	
Unspecified	73	7	20	3	2,502	7	1,909	7	431	6	4,936	7	
Total	1,094	100	658	100	35,742	100	28,546	100	7,316	100	73,357	100	
Median yr.	3	NAp	4	NAp	5	NAp	5	NAp	5	NAp	5	NAp	100
At present company:													
0< to ≤1	126	12	52	8	5,393	15	2,858	10	917	13	9,346	13	
1< to ≤5	313	29	193	29	9,394	26	5,954	21	1,932	26	17,785	24	
5< to ≤10	294	27	215	33	6,929	19	6,413	22	1,602	22	15,454	21	
10< to ≤15	175	16	64	10	4,541	13	4,194	15	1,018	14	9,992	14	
15< to ≤20	101	9	92	14	3,130	9	3,124	11	544	7	6,992	10	
20< to ≤25	55	5	28	4	1,548	4	1,817	6	389	5	3,837	5	
25< to ≤30	20	2	5	1	1,420	4	1,335	5	311	4	3,091	4	
30<	10	1	10	2	1,976	6	1,951	7	415	6	4,362	6	
Unspecified	0	0	0	0	1,411	4	899	3	189	3	2,499	3	
Total	1,094	100	658	100	35,742	100	28,546	100	7,316	100	73,357	100	
Median yr.	7	NAp	7	NAp	7	NAp	9	NAp	8	NAp	8	NAp	100
Total mining:													
0< to ≤1	88	8	47	7	4,017	11	2,175	8	676	9	7,003	10	
1< to ≤5	253	23	150	23	7,154	20	4,215	15	1,535	21	13,307	18	
5< to ≤10	263	24	171	26	6,886	19	6,218	22	1,496	20	15,035	20	
10< to ≤15	205	19	53	8	4,783	13	4,171	15	995	14	10,207	14	
15< to ≤20	98	9	70	11	3,488	10	3,134	11	553	8	7,342	10	
20< to ≤25	48	4	23	4	1,860	5	1,902	7	413	6	4,247	6	
25< to ≤30	20	2	0	0	1,624	5	1,301	5	306	4	3,250	4	
30<	27	2	10	2	2,151	6	1,890	7	477	7	4,555	6	
Unspecified	93	9	134	20	3,778	11	3,539	12	866	12	8,409	11	
Total	1,094	100	658	100	35,742	100	28,546	100	7,316	100	73,357	100	
Median yr.	8	NAp	7	NAp	9	NAp	10	NAp	9	NAp	9	NAp	100

NAp Not applicable.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-25.—Stone mining 1986 workforce estimates: training received, by work location

Job training for last 2 yr, h	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total		
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	
0	0	0	0	0	2,528	7	2,354	8	1,075	15	5,957	8	
1-8	95	9	63	10	3,011	8	2,533	9	550	8	6,252	9	
9-15	0	0	7	1	1,321	4	1,814	6	235	3	3,376	5	
16	454	41	181	27	6,534	18	4,253	15	518	7	11,939	16	
17-40	223	20	143	22	4,904	14	4,405	15	805	11	10,480	14	
41-80	77	7	68	10	3,143	9	2,128	7	471	6	5,887	8	
81-160	17	2	15	2	1,777	5	1,617	6	321	4	3,746	5	
161+	55	5	40	6	1,068	3	1,292	5	210	3	2,665	4	
Unspecified	175	16	141	21	11,457	32	8,150	29	3,131	43	23,055	31	
Total	1,094	100	658	100	35,742	100	28,546	100	7,316	100	73,357	100	
Mean training .h	55	NAp	47	NAp	44	NAp	55	NAp	47	NAp	49	NAp	100

NAp Not applicable.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-26.—Stone mining 1986 workforce estimates: age distribution, by work location

Age, yr	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
15-20	28	3	7	1	739	2	411	1	81	1	1,267	2
21-23	40	4	7	1	2,022	6	999	4	321	4	3,389	5
24-26	45	4	62	9	2,897	8	1,816	6	435	6	5,255	7
27-29	130	12	53	8	3,080	9	2,564	9	603	8	6,430	9
30-34	266	24	94	14	4,857	14	4,477	16	1,003	14	10,697	15
35-39	181	17	90	14	4,568	13	4,335	15	1,003	14	10,177	14
40-49	191	17	210	32	7,570	21	6,803	24	1,687	23	16,461	22
50+	213	19	136	21	8,748	24	6,693	23	2,022	28	17,812	24
Unspecified	0	0	0	0	1,261	4	449	2	160	2	1,869	3
Total	1,094	100	658	100	35,742	100	28,546	100	7,316	100	73,357	100
Mean age, yr	38	NAp	40	NAp	40	NAp	40	NAp	41	NAp	40	NAp

NAp Not applicable.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-27.—Stone mining 1986 workforce estimates: sex, race, and education, by work location

	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Sex:												
Male	1,073	98	630	96	34,986	98	27,969	98	3,992	55	68,649	94
Female	8	1	23	4	384	1	437	2	3,289	45	4,142	6
Unspecified	13	1	5	1	372	1	140	0	35	0	565	1
Total	1,094	100	658	100	35,742	100	28,546	100	7,316	100	73,357	100
Race:												
White	1,058	97	645	98	28,993	81	23,297	82	6,855	94	60,848	83
Black	10	1	8	1	2,563	7	2,518	9	108	1	5,207	7
Hispanic	7	1	0	0	3,094	9	2,157	8	202	3	5,460	7
Other	0	0	0	0	691	2	404	1	88	1	1,183	2
Unspecified	20	2	5	1	402	1	170	1	63	1	659	1
Total	1,094	100	658	100	35,742	100	28,546	100	7,316	100	73,357	100
Education level:												
Some elementary	150	14	52	8	3,964	11	2,129	7	68	1	6,362	9
Some high school	283	26	108	16	7,711	22	4,761	17	314	4	13,177	18
High school diploma	471	43	369	56	15,948	45	13,493	47	2,989	41	33,269	45
Vocational diploma	103	9	83	13	2,093	6	2,170	8	396	5	4,845	7
Some college	55	5	32	5	1,926	5	2,769	10	1,700	23	6,481	9
College degree	20	2	10	2	826	2	1,274	4	1,505	21	3,635	5
Unspecified	13	1	5	1	3,274	9	1,951	7	344	5	5,587	8
Total	1,094	100	658	100	35,742	100	28,546	100	7,316	100	73,357	100

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-28.—Stone mining 1986 workforce estimates:¹ experience at job, by hours of training received in last 2 years

Experience at present job, yr	0	1-8	9-15	16	17-40	41-80	81-160	161+	Unspecified	Total	Mean, h
0< to ≤1:											
Workers	635	1,595	596	998	2,661	1,364	808	704	3,705	13,067	62
pct	5	12	5	8	20	10	6	5	28	100	NAp
1< to ≤2:											
Workers	373	646	333	1,474	1,243	884	598	442	2,372	8,365	60
pct	4	8	4	18	15	11	7	5	28	100	NAp
2< to ≤3:											
Workers	531	495	255	1,165	774	467	395	312	1,791	6,185	64
pct	9	8	4	19	13	8	6	5	29	100	NAp
3< to ≤5:											
Workers	808	565	456	1,633	1,061	699	399	282	2,489	8,392	44
pct	10	7	5	19	13	8	5	3	30	100	NAp
5< to ≤10:											
Workers	1,288	1,318	790	2,997	2,019	1,054	676	233	3,837	14,212	34
pct	9	9	6	21	14	7	5	2	27	100	NAp
10< to ≤20:											
Workers	1,054	809	563	2,102	1,276	773	487	222	2,415	9,702	36
pct	11	8	6	22	13	8	5	2	25	100	NAp
20<:											
Workers	363	303	136	999	487	248	102	121	1,054	3,814	37
pct	10	8	4	26	13	7	3	3	28	100	NAp
Unspecified:											
Workers	123	148	101	265	464	65	56	170	3,219	4,611	62
pct	3	3	2	6	10	1	1	4	70	100	NAp
Total:											
Workers.....	5,175	5,879	3,230	11,632	9,985	5,554	3,522	2,488	20,883	68,347	48
pct.....	8	9	5	17	15	8	5	4	31	100	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-29.—Stone mining 1986 workforce estimates:¹ experience at job, by years of age

Experience at present job, yr	15-20	21-23	24-26	27-29	30-34	35-39	40-49	50+	Unspecified	Total	Mean, yr
0< to ≤1:											
Workers	826	1,539	1,788	1,615	2,299	1,571	1,980	1,088	431	13,067	33
pct	6	12	14	12	17	12	15	8	3	100	NAp
1< to ≤2:											
Workers	211	679	920	988	1,348	1,282	1,515	1,226	195	8,365	36
pct	3	8	11	12	16	15	18	15	2	100	NAp
2< to ≤3:											
Workers	91	376	620	753	1,070	995	1,327	875	79	6,185	37
pct	1	6	10	12	17	16	21	14	1	100	NAp
3< to ≤5:											
Workers	30	294	757	853	1,400	1,352	1,833	1,692	181	8,392	39
pct	0	4	9	10	17	16	22	20	2	100	NAp
5< to ≤10:											
Workers	0	93	637	1,303	2,495	2,313	3,780	3,369	222	14,212	41
pct	0	1	4	9	18	16	27	24	2	100	NAp
10< to ≤20:											
Workers	0	0	0	78	797	1,349	3,140	4,065	274	9,702	48
pct	0	0	0	1	8	14	32	42	3	100	NAp
20<:											
Workers	0	0	0	0	0	19	720	3,015	61	3,814	55
pct	0	0	0	0	0	0	19	79	2	100	NAp
Unspecified:											
Workers	62	232	270	414	650	578	957	1,138	311	4,611	40
pct	1	5	6	9	14	13	21	25	7	100	NAp
Total:											
Workers.....	1,220	3,214	4,992	6,005	9,988	9,458	15,250	16,466	1,754	68,347	40
pct.....	2	5	7	9	15	14	22	24	3	100	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-30.—Stone mining 1986 workforce estimates:¹ experience at job, by sex

Experience at present job, yr	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	12,587	19	345	23	134	25	13,067	19
1< to ≤2	8,113	12	196	13	56	11	8,365	12
2< to ≤3	5,940	9	175	12	70	13	6,185	9
3< to ≤5	8,178	12	188	13	25	5	8,392	12
5< to ≤10	13,767	21	392	26	53	10	14,212	21
10< to ≤20	9,496	14	110	7	96	18	9,702	14
20<	3,763	6	26	2	26	5	3,814	6
Unspecified	4,482	7	59	4	70	13	4,611	7
Total	66,326	100	1,490	100	531	100	68,347	100
Median	5	NAp	4	NAp	3	NAp	5	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-31.—Stone mining 1986 workforce estimates:¹ experience at job, by race

Experience at present job, yr	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	10,567	19	1,089	21	1,072	20	190	17	148	25	13,067	19
1< to ≤2	6,788	12	572	11	743	14	168	15	93	15	8,365	12
2< to ≤3	5,114	9	337	7	530	10	153	14	52	9	6,185	9
3< to ≤5	6,968	12	634	12	665	12	92	8	32	5	8,392	12
5< to ≤10	11,645	21	972	19	1,284	24	234	21	77	13	14,212	21
10< to ≤20	8,027	14	747	15	641	12	159	14	128	21	9,702	14
20<	3,370	6	228	4	144	3	40	4	32	5	3,814	6
Unspecified	3,692	7	539	11	273	5	66	6	41	7	4,611	7
Total	56,171	100	5,119	100	5,353	100	1,101	100	603	100	68,347	100
Median	5	NAp	4	NAp	4	NAp	4	NAp	3	NAp	5	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-32.—Stone mining 1986 workforce estimates:¹ experience at job, by education

Experience at present job, yr	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	689	11	2,534	19	6,434	21	1,043	23	1,204	24	483	19	680	13	13,067	19
1< to ≤2	573	9	1,333	10	4,190	13	578	13	621	12	420	16	649	12	8,365	12
2< to ≤3	447	7	1,162	9	2,971	9	465	10	528	10	286	11	327	6	6,185	9
3< to ≤5	684	11	1,506	12	3,958	13	738	16	756	15	322	13	426	8	8,392	12
5< to ≤10	1,506	24	2,659	20	6,916	22	967	21	1,048	20	524	21	592	11	14,212	21
10< to ≤20	1,298	20	2,262	17	4,144	13	479	11	641	13	318	12	561	10	9,702	14
20<	627	10	1,009	8	1,504	5	138	3	197	4	137	5	201	4	3,814	6
Unspecified	526	8	603	5	1,254	4	112	2	125	2	58	2	1,933	36	4,611	7
Total	6,349	100	13,068	100	31,371	100	4,520	100	5,120	100	2,549	100	5,370	100	68,347	100
Median	7	NAp	5	NAp	4	NAp	4	NAp	4	NAp	4	NAp	4	NAp	5	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-33.—Stone mining 1986 workforce estimates:¹ experience at company, by hours of training received in last 2 years

Experience at present company, yr	0	1-8	9-15	16	17-40	41-80	81-160	161+	Unspecified	Total	Mean, h
0< to ≤1:											
Workers	485	1,223	414	328	1,716	800	389	344	3,042	8,741	51
pct	6	14	5	4	20	9	4	4	35	100	NAp
1< to ≤5:											
Workers	1,211	1,022	608	2,241	2,307	1,619	876	906	5,709	16,500	71
pct	7	6	4	14	14	10	5	5	35	100	NAp
5< to ≤10:											
Workers	1,162	1,215	716	3,179	2,009	1,186	806	306	3,703	14,282	38
pct	8	9	5	22	14	8	6	2	26	100	NAp
10< to ≤15:											
Workers	746	930	433	2,100	1,118	810	704	279	2,146	9,269	42
pct	8	10	5	23	12	9	8	3	23	100	NAp
15< to ≤20:											
Workers	588	642	414	1,364	1,185	491	392	152	1,443	6,670	35
pct	9	10	6	20	18	7	6	2	22	100	NAp
20< to ≤25:											
Workers	243	296	226	754	607	263	99	106	958	3,550	34
pct	7	8	6	21	17	7	3	3	27	100	NAp
25< to ≤30:											
Workers	249	184	206	719	306	174	106	109	815	2,867	39
pct	9	6	7	25	11	6	4	4	28	100	NAp
30<:											
Workers	425	353	157	848	476	198	144	118	1,407	4,126	35
pct	10	9	4	21	12	5	3	3	34	100	NAp
Unspecified:											
Workers	67	13	56	100	260	13	5	169	1,659	2,343	131
pct	3	1	2	4	11	1	0	7	71	100	NAp
Total:											
Workers.....	5,175	5,879	3,230	11,632	9,985	5,554	3,522	2,488	20,883	68,347	48
pct	8	9	5	17	15	8	5	4	31	100	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-34.—Stone mining 1986 workforce estimates:¹ experience at company, by years of age

Experience at present company, yr	15-20	21-23	24-26	27-29	30-34	35-39	40-49	50+	Unspecified	Total	Mean, yr
0< to ≤1:											
Workers	805	1,442	1,368	1,046	1,315	886	946	545	388	8,741	31
pct	9	16	16	12	15	10	11	6	4	100	NAp
1< to ≤5:											
Workers	400	1,592	2,401	2,208	2,523	2,015	2,877	1,988	496	16,500	35
pct	2	10	15	13	15	12	17	12	3	100	NAp
5< to ≤10:											
Workers	0	112	1,098	2,341	3,383	2,528	2,683	1,945	193	14,282	37
pct	0	1	8	16	24	18	19	14	1	100	NAp
10< to ≤15:											
Workers	0	0	0	234	2,366	2,344	2,482	1,723	119	9,269	41
pct	0	0	0	3	26	25	27	19	1	100	NAp
15< to ≤20:											
Workers	0	0	0	0	125	1,412	3,026	2,063	43	6,670	46
pct	0	0	0	0	2	21	45	31	1	100	NAp
20< to ≤25:											
Workers	0	0	0	0	0	83	1,912	1,522	34	3,550	50
pct	0	0	0	0	0	2	54	43	1	100	NAp
25< to ≤30:											
Workers	0	0	0	0	0	0	681	2,175	12	2,867	54
pct	0	0	0	0	0	0	24	76	0	100	NAp
30<:											
Workers	0	0	0	0	0	0	0	131	3,957	4,126	57
pct	0	0	0	0	0	0	3	96	1	100	NAp
Unspecified:											
Workers	15	68	125	177	277	190	512	546	434	2,343	41
pct	1	3	5	8	12	8	22	23	19	100	NAp
Total:											
Workers.....	1,220	3,214	4,992	6,005	9,988	9,458	15,250	16,466	1,754	68,347	40
pct	2	5	7	9	15	14	22	24	3	100	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-35.—Stone mining 1986 workforce estimates:¹ experience at company, by sex

Experience at present company, yr	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	8,412	13	225	15	104	20	8,741	13
1< to ≤5	15,916	24	451	30	133	25	16,500	24
5< to ≤10	13,623	21	588	39	71	13	14,282	21
10< to ≤15	9,039	14	150	10	79	15	9,269	14
15< to ≤20	6,574	10	36	2	60	11	6,670	10
20< to ≤25	3,500	5	13	1	37	7	3,550	5
25< to ≤30	2,848	4	6	0	13	2	2,867	4
30<	4,126	6	0	0	0	0	4,126	6
Unspecified	2,288	3	22	1	34	6	2,343	3
Total	66,326	100	1,490	100	531	100	68,347	100
Median...yr.	8	NAp	6	NAp	6	NAp	8	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown..

Table E-36.—Stone mining 1986 workforce estimates:¹ experience at company, by race

Experience at present company, yr	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	6,929	12	751	15	807	15	149	14	106	18	8,741	13
1< to ≤5	13,726	24	951	19	1,449	27	225	20	149	25	16,500	24
5< to ≤10	11,518	21	1,154	23	1,307	24	212	19	90	15	14,282	21
10< to ≤15	7,547	13	792	15	578	11	238	22	115	19	9,269	14
15< to ≤20	5,679	10	479	9	338	6	101	9	73	12	6,670	10
20 to ≤25	3,140	6	236	5	111	2	30	3	33	5	3,550	5
25 to ≤30	2,424	4	226	4	157	3	48	4	12	2	2,867	4
30<	3,512	6	268	5	289	5	43	4	13	2	4,126	6
Unspecified	1,695	3	263	5	316	6	55	5	13	2	2,343	3
Total	56,171	100	5,119	100	5,353	100	1,101	100	603	100	68,347	100
Median...yr.	8	NAp	9	NAp	6	NAp	9	NAp	7	NAp	8	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown..

Table E-37.—Stone mining 1986 workforce estimates:¹ experience at company, by education

Experience at present company, yr	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	587	9	1,869	14	4,002	13	665	15	690	13	297	12	630	12	8,741	13
1< to ≤5	1,304	21	2,983	23	7,767	25	1,304	29	1,214	24	642	25	1,286	24	16,500	24
5< to ≤10	1,102	17	2,530	19	6,726	21	1,101	24	1,262	25	682	27	879	16	14,282	21
10< to ≤15	839	13	1,434	11	4,642	15	604	13	856	17	404	16	491	9	9,269	14
15< to ≤20	815	13	1,516	12	3,028	10	383	8	389	8	200	8	338	6	6,670	10
20< to ≤25	393	6	730	6	1,715	5	209	5	210	4	89	3	205	4	3,550	5
25< to ≤30	436	7	766	6	1,201	4	88	2	162	3	52	2	162	3	2,867	4
30<	778	12	863	7	1,587	5	97	2	166	3	105	4	530	10	4,126	6
Unspecified	95	2	377	3	703	2	70	2	171	3	77	3	849	16	2,343	3
Total	6,349	100	13,068	100	31,371	100	4,520	100	5,120	100	2,549	100	5,370	100	68,347	100
Median...yr.	11	NAp	8	NAp	8	NAp	7	NAp	8	NAp	7	NAp	7	NAp	8	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown..

Table E-38.—Stone mining 1986 workforce estimates:¹ age, by education

Age, yr	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
15-20	13	1	254	21	679	56	88	7	86	7	0	0	100	8	1,220	100
21-23	96	3	604	19	1,671	52	244	8	225	7	44	1	329	10	3,214	100
24-26	182	4	886	18	2,755	55	419	8	328	7	97	2	325	7	4,992	100
27-29	217	4	905	15	3,164	53	638	11	447	7	199	3	435	7	6,005	100
30-34	439	4	1,407	14	5,363	54	733	7	946	9	476	5	625	6	9,988	100
35-39	504	5	1,569	17	4,370	46	744	8	1,106	12	591	6	574	6	9,458	100
40-49	1,596	10	3,267	21	6,833	45	893	6	1,212	8	626	4	822	5	15,250	100
50+	3,240	20	3,924	24	6,059	37	621	4	716	4	450	3	1,457	9	16,466	100
Unspecified	63	4	251	14	477	27	141	8	53	3	66	4	703	40	1,754	100
Total	6,349	9	13,068	19	31,371	46	4,520	7	5,120	7	2,549	4	5,370	8	68,347	100
Mean age...yr.	48	NAp	42	NAp	38	NAp	37	NAp	38	NAp	40	NAp	41	NAp	40	NAp

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-39.—Stone mining 1986 workforce estimates:¹ age, race, and education, by sex

	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Age, yr:								
15-20	1,186	2	28	2	6	1	1,220	2
21-23	3,084	5	66	4	64	12	3,214	5
24-26	4,853	7	101	7	37	7	4,992	7
27-29	5,724	9	223	15	57	11	6,005	9
30-34	9,667	15	268	18	54	10	9,988	15
35-39	9,118	14	285	19	55	10	9,458	14
40-49	14,845	22	325	22	80	15	15,250	22
50+	16,216	24	168	11	82	16	16,466	24
Unspecified	1,633	2	26	2	95	18	1,754	3
Total	66,326	100	1,490	100	531	100	68,347	100
Mean age...yr.	40	NAp	36	NAp	36	NAp	40	NAp
Race:								
White	54,694	82	1,316	88	160	30	56,171	82
Black	4,981	8	118	8	20	4	5,119	7
Hispanic	5,297	8	43	3	13	2	5,353	8
Other	1,058	2	13	1	30	6	1,101	2
Unspecified	295	0	0	0	308	58	603	1
Total	66,326	100	1,490	100	531	100	68,347	100
Education level:								
Some elementary	6,324	10	19	1	7	1	6,349	9
Some high school	12,840	19	134	9	94	18	13,068	19
High school diploma	30,327	46	876	59	168	32	31,371	46
Vocational diploma	4,333	7	86	6	101	19	4,520	7
Some college	4,894	7	203	14	23	4	5,120	7
College degree	2,440	4	108	7	0	0	2,549	4
Unspecified	5,169	8	64	4	138	26	5,370	8
Total	66,326	100	1,490	100	531	100	68,347	100

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-40.—Stone mining 1986 workforce estimates:¹ age and education, by race

	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Age, yr:												
15-20	1,049	2	61	1	91	2	7	1	13	2	1,220	2
21-23	2,679	5	194	4	264	5	38	3	39	6	3,214	5
24-26	3,999	7	268	5	549	10	114	10	63	10	4,992	7
27-29	4,932	9	417	8	439	8	138	13	79	13	6,005	9
30-34	8,283	15	702	14	750	14	167	15	86	14	9,988	15
35-39	7,810	14	692	14	747	14	118	11	91	15	9,458	14
40-49	12,402	22	1,482	29	1,050	20	247	22	69	11	15,250	22
50+	13,826	25	1,259	25	1,059	20	218	20	105	17	16,466	24
Unspecified	1,192	2	44	1	404	8	56	5	59	10	1,754	3
Total	56,171	100	5,119	100	5,353	100	1,101	100	603	100	68,347	100
Mean age, yr.	40	NAp	41	NAp	39	NAp	39	NAp	37	NAp	40	NAp
Education level:												
Some elementary	4,306	8	782	15	1,218	23	31	3	13	2	6,349	9
Some high school	9,943	18	1,487	29	1,294	24	235	21	109	18	13,068	19
High school diploma	27,144	48	1,906	37	1,628	30	451	41	242	40	31,371	46
Vocational diploma	3,910	7	145	3	214	4	162	15	89	15	4,520	7
Some college	4,513	8	226	4	249	5	117	11	15	3	5,120	7
College degree	2,343	4	95	2	54	1	33	3	24	4	2,549	4
Unspecified	4,012	7	479	9	696	13	73	7	110	18	5,370	8
Total	56,171	100	5,119	100	5,353	100	1,101	100	603	100	68,347	100

NAp Not applicable.

¹Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-41.—Stone mining 1986 workforce estimates: number of workers and coefficient of variation, by employment size class

Employment size class ¹	Workers	CV, pct
1-19	18,511	4.4
20-49	17,215	7.8
50-99	10,145	6.0
100-249	23,219	3.4
250-499	3,726	.8
500+	540	5.4
All groupings	73,357	1.1

¹MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-42.—Stone mining 1986 workforce estimates: number of workers and coefficient of variation, by job title

Job title grouping ¹	Workers	CV, pct
Backhoe-crane-dragline-shovel operator	2,118	7.4
Beltman-belt repairman	319	11.0
Blaster	336	11.7
Deckhand-barge and dredge operator	171	37.3
Dozer-heavy and mobile equipment operator	1,775	7.2
Driller-rock bolter	2,058	2.8
Electrician-lampman	1,433	4.3
Front-end loader-forklift operator	6,095	4.2
Grader-scrapers operator	415	20.4
Laborer-miner-utility man	8,771	3.9
Manager-foreman-supervisor:		
General	4,543	3.2
Maintenance	708	8.1
Working	2,362	5.8
Mechanic-welder-oiler-machinist	11,458	2.8
Mine technical support	4,524	3.9
Office worker	5,010	5.6
Plant operator-warehouseman	11,377	1.9
Shuttle car-tram operator	213	26.5
Stone cutter-finisher	864	21.2
Truck driver	8,808	3.6
All groupings	73,357	1.1

¹As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-43.—Stone mining 1986 workforce estimates:¹ number of workers and coefficient of variation, by principal equipment operated

Equipment operated grouping ²	Workers	CV, pct
Backhoe-crane-dragline-shovel	2,228	6.6
Belt	404	9.8
Dozer-heavy and mobile equipment	1,616	9.7
Drill (underground)-rock bolter	485	25.8
Drill (surface)	1,898	4.3
Explosives	332	11.4
Front-end loader-forklift	7,538	4.0
Grader-scaper	427	19.8
Handtools (powered and nonpowered)	10,370	3.8
Hoist-elevator	36	62.1
Many equipment	684	14.5
Miscellaneous utility equipment	5,423	6.5
Plant equipment	9,105	1.8
Pump	168	23.9
Scale-lab equipment-controls	3,316	4.9
Shuttle car-locomotive	312	18.9
Stone cutting-finishing machine	868	20.7
Truck (haulage)	9,119	3.6
Truck (utility)-personnel carrier	989	7.4
Welding machine-lathe	2,904	5.9
None	9,235	3.1
Not elsewhere classified	193	33.5
Unspecified	695	14.0
All groupings	68,347	1.3

¹Excluding job title category of office workers.

²See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-44.—Stone mining 1986 workforce estimates: number of workers and coefficient of variation, by work location

Work location	Workers	CV, pct
Underground mine	1,094	11.7
Surface at underground mine	658	16.0
Surface mine	35,742	1.7
Plant or mill	28,546	3.1
Office	7,316	4.0
All groupings	73,357	1.1

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-45.—Stone mining 1986 workforce estimates:¹ number of workers and coefficient of variation, by experience at job, company, and mining

Experience, yr	Workers	CV, pct
At present job:		
0< to \leq 1	13,067	4.7
1< to \leq 2	8,365	3.7
2< to \leq 3	6,185	4.9
3< to \leq 5	8,392	5.9
5< to \leq 10	14,212	3.8
10< to \leq 20	9,702	6.0
20<	3,814	8.9
Unspecified	4,611	15.2
All groupings	68,347	1.3
At present company:		
0< to \leq 1	8,741	4.1
1< to \leq 5	16,500	3.5
5< to \leq 10	14,282	2.6
10< to \leq 15	9,269	3.8
15< to \leq 20	6,670	5.4
20< to \leq 25	3,550	4.8
25< to \leq 30	2,867	9.0
30<	4,126	9.3
Unspecified	2,343	19.2
All groupings	68,347	1.3
Total mining:		
0< to \leq 1	6,577	4.3
1< to \leq 5	12,337	3.2
5< to \leq 10	13,951	3.6
10< to \leq 15	9,500	3.6
15< to \leq 20	6,994	3.7
20< to \leq 25	3,955	4.0
25< to \leq 30	3,037	7.5
30<	4,269	6.6
Unspecified	7,727	8.0
All groupings	68,347	1.3

¹Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-46.—Stone mining 1986 workforce estimates:¹ number of workers and coefficient of variation, by training received

Job training for last 2 yr, h	Workers	CV, pct
0	5,175	15.3
1-8	5,879	12.2
9-15	3,230	9.0
16	11,632	6.3
17-40	9,985	7.1
41-80	5,554	6.5
81-160	3,522	6.6
161+	2,488	14.2
Unspecified	20,883	7.3
All groupings	68,347	1.3

¹Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-47.—Stone mining 1986 workforce estimates:¹ number of workers and coefficient of variation, by age

Age, yr	Workers	CV, pct
15-20	1,220	7.0
21-23	3,214	3.1
24-26	4,992	4.0
27-29	6,005	4.7
30-34	9,988	2.7
35-39	9,458	3.6
40-49	15,250	2.6
50+	16,466	4.0
Unspecified	1,754	19.0
All groupings	68,347	1.3

¹Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

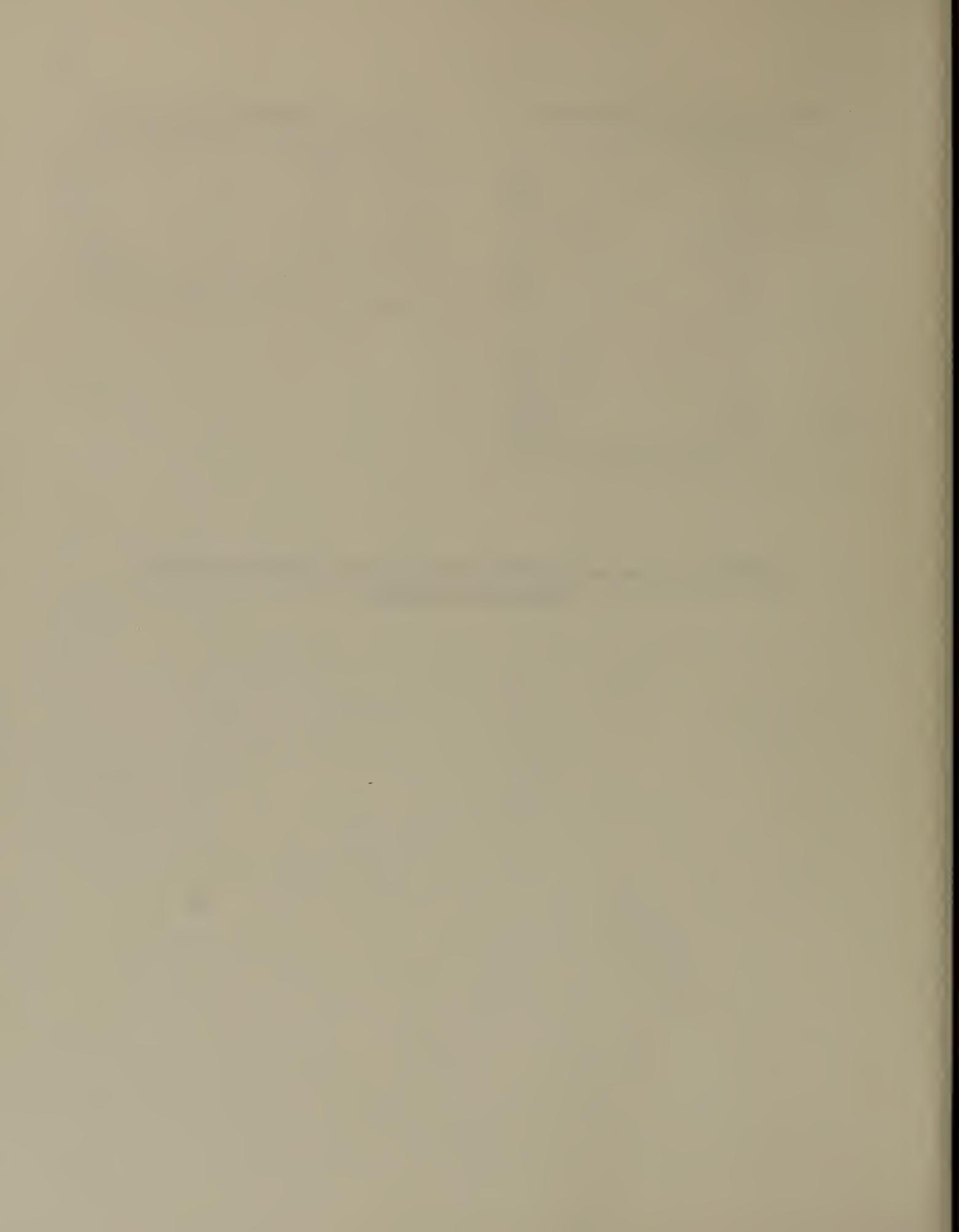
Table E-48.—Stone mining 1986 workforce estimates:¹ number of workers and coefficient of variation, by sex, race, and education

	Workers	CV, pct
Sex:		
Male	66,326	1.4
Female	1,490	6.9
Unspecified	531	25.3
All groupings	68,347	1.3
Race:		
White	56,171	1.4
Black	5,119	14.1
Hispanic	5,353	7.1
Other	1,101	15.5
Unspecified	603	31.3
All groupings	68,347	1.3
Education level:		
Some elementary	6,349	8.5
Some high school	13,068	4.0
High school diploma	31,371	4.1
Vocational diploma	4,520	9.7
Some college	5,120	7.7
College degree	2,549	3.9
Unspecified	5,370	15.1
All groupings	68,347	1.3

¹Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

**APPENDIX F.—MINING INDUSTRY POPULATION SURVEY LETTERS
AND QUESTIONNAIRE**





United States Department of the Interior

BUREAU OF MINES
2401 E STREET, NW.
WASHINGTON, D.C. 20241

Dear Mine Manager:

The Bureau of Mines, U.S. Department of the Interior, is requesting your help in conducting a survey of the mining industry. The survey is designed to characterize the nation's mine-worker population by occupation, job experience, training, age, and other factors. These data are necessary to accurately analyze the nation's mine accidents. At this time, the information sought by this survey cannot be obtained from any other source.

Your firm was randomly selected to represent firms of a similar size in your industry. Although your response to this survey is voluntary, the validity of the results depends upon a very high response rate. We urge you, therefore, to respond as completely and accurately as possible based upon information from your personnel files, management records, or direct response from individual workers at your mine.

Under no circumstances will the information you provide be identified by individual mine, company, or worker. The data will be used for statistical purposes only and the results of the survey when analyzed with accident statistics will be made available to the public in the form of official publications.

Instructions for completing the survey questionnaire are on the enclosed survey form. Questions regarding the survey should be directed to:

Ms. Shail Butani
Bureau of Mines
5629 Minnehaha Avenue South
Minneapolis, MN 55417
Telephone: (612) 725-4500

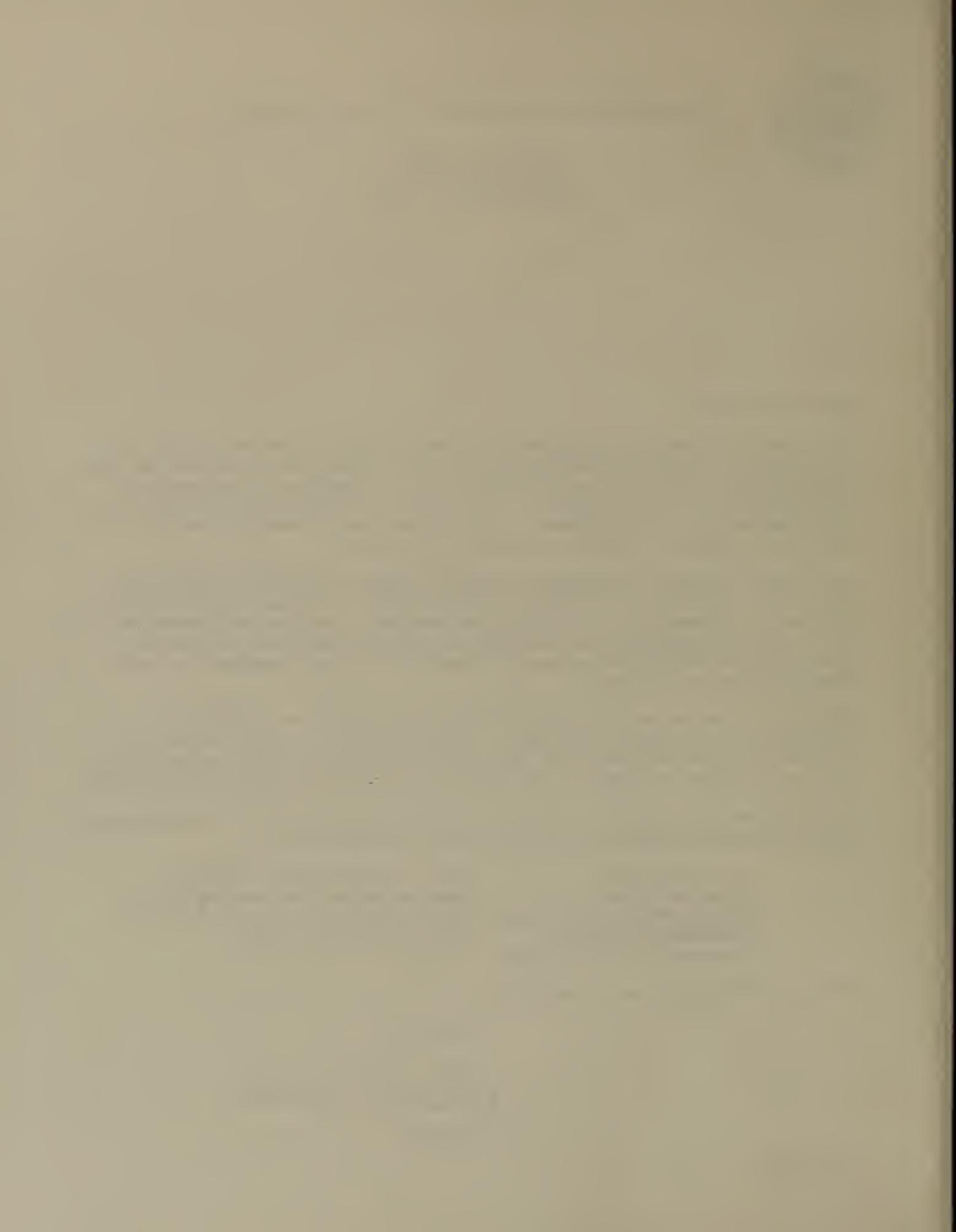
(Note: Collect calls regarding
this survey will be accepted during
regular business hours, 8:00 a.m. to
4:00 p.m., Central Time.)

Thank you for your time and effort.

Sincerely,

Robert C. Norton
Director

Enclosure





United States Department of the Interior

BUREAU OF MINES
2401 E STREET, NW.
WASHINGTON, D.C. 20241

Dear Employer:

Recently, we wrote to you requesting your help in obtaining data for a survey for the mining industry. This information will be used to produce the characteristics of the nation's mine-worker population in order to analyze the nation's mine accident data more accurately. We have not yet received your response and have enclosed an additional survey questionnaire in case the original was misplaced or did not reach you.

Because your firm was randomly selected to represent firms of a similar size in your industry, we are making every effort to obtain your response to ensure a true representation of those firms. Your response is strictly confidential and will be used for statistical purposes only.

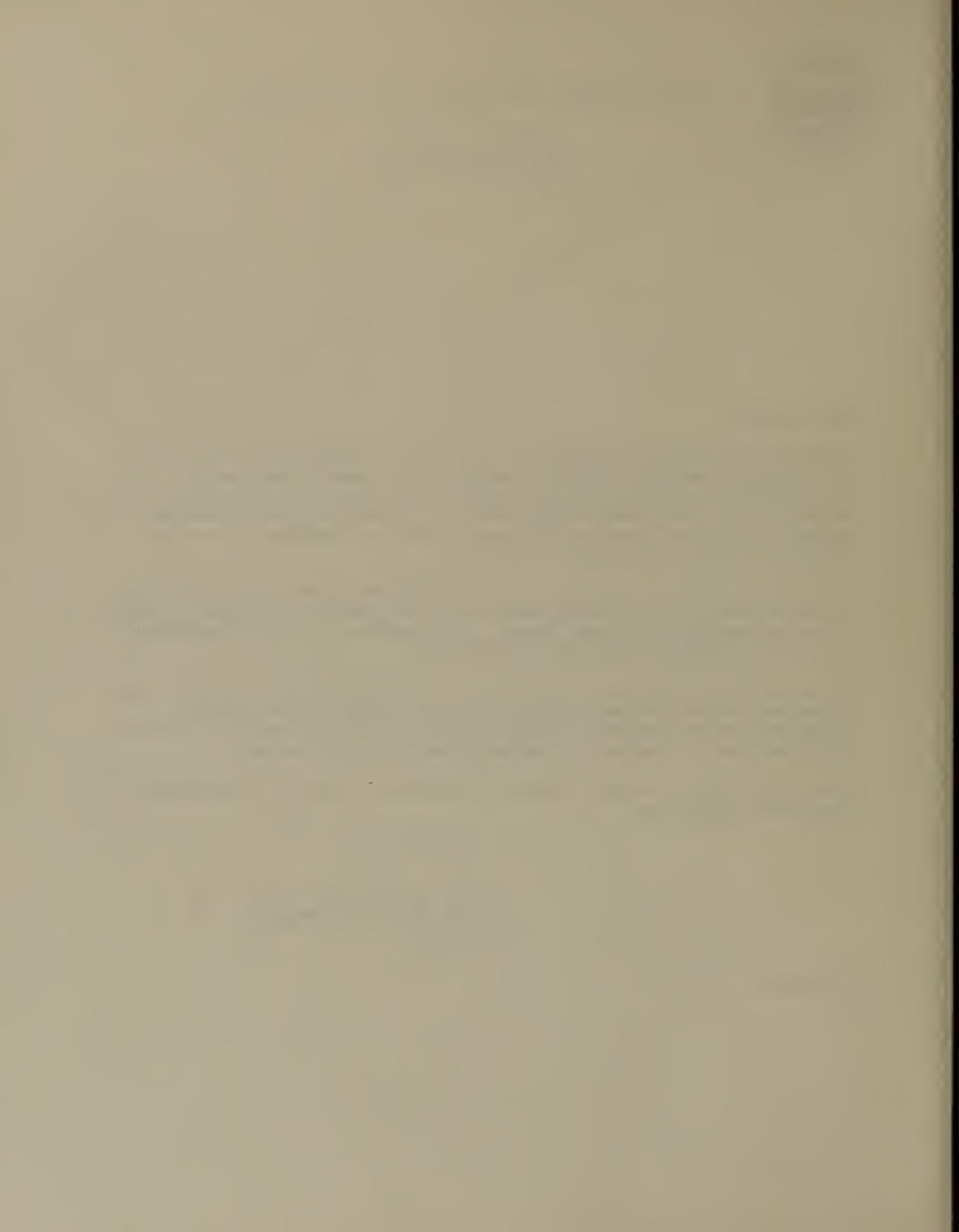
If you have any questions, please refer to the instructions on the first page of the questionnaire or call collect, Ms. Shail Butani at 612-725-4500. If you prefer, you may report your information directly by telephone. A response during the next 2 weeks would be great assistance to the survey.

Thank you for your help and support in the Bureau's effort to characterize the mine-worker population.

Sincerely,

Robert C. Horton
Director

Enclosure



U.S. BUREAU OF MINES
Twin Cities Research Center
5629 Minnehaha Avenue South
Minneapolis, MN 55417
(612) 725-4500



**MINING INDUSTRY
POPULATION SURVEY**

INSTRUCTIONS:

1. Fill out this form as completely as possible and return it in the enclosed stamped envelope within three weeks.
2. This form is only for the operation with mine I.D. number as shown on the address label. Do not use for any other operation.
3. As an alternative to completing the forms, you are welcome to send copies of any administrative records, containing the requested information on *all* employees. However, it is very important that all the information requested on the forms be contained in the records.
4. (a) Obtain a list or lists of *all* the employees (hourly, salaried, managerial, and office workers, etc.) working in the operation with mine I.D. number shown on the label. It is important that each employee appear on one and only one list.
(b) Sequentially number the employees starting with one list continuing until all the lists are exhausted.
(c) Determine the total number of employees at this mine I.D. operation. Note: This number should be the same as the last number on the employees list.
(d) Based on the total number of employees, mark the appropriate employment size box below.

Total No. of Employees	Selection Numbers
1 - 49	<input type="checkbox"/> All employees (1, 2, 3, 4, 5 ...)
50 - 99	<input type="checkbox"/> Every other employee starting with employee No. 1 (1, 3, 5, 7, 9 ...)
100 - 249	<input type="checkbox"/> Every 5th employee starting with employee No. 4 (4, 9, 14, 19, 24 ...)
250 - 499	<input type="checkbox"/> Every 10th employee starting with employee No. 7 (7, 17, 27, 37, 47 ...)
500 - 999	<input type="checkbox"/> Every 20th employee starting with employee No. 12 (12, 32, 52, 72, 92 ...)
1,000 +	<input type="checkbox"/> Every 30th employee starting with employee No. 15 (15, 45, 75, 105, 135 ...)

- (e) Record the information on the attached questionnaire for each worker whose number on the employee list corresponds to the selection numbers that fall in the above marked employment size category. Note: Depending on the total number of employees at this mine, it may not be necessary to complete all lines on the questionnaire.
- (f) See Example below.
5. If you should have any questions or need assistance in completing the form please contact _____
6. Company representative to be contacted regarding this report: _____

Name _____

Title _____

Phone () _____

EXAMPLE:

Suppose there are 153 hourly employees, 31 salaried employees, and 9 office employees at Mine Operation XYZ.

Procedure: 1. Number the workers on one list first, say office (1-9).

2. Continuously number the workers on the 2nd list, say salaried (10-40).

3. Continuously number the workers on the next list, hourly (41-193).

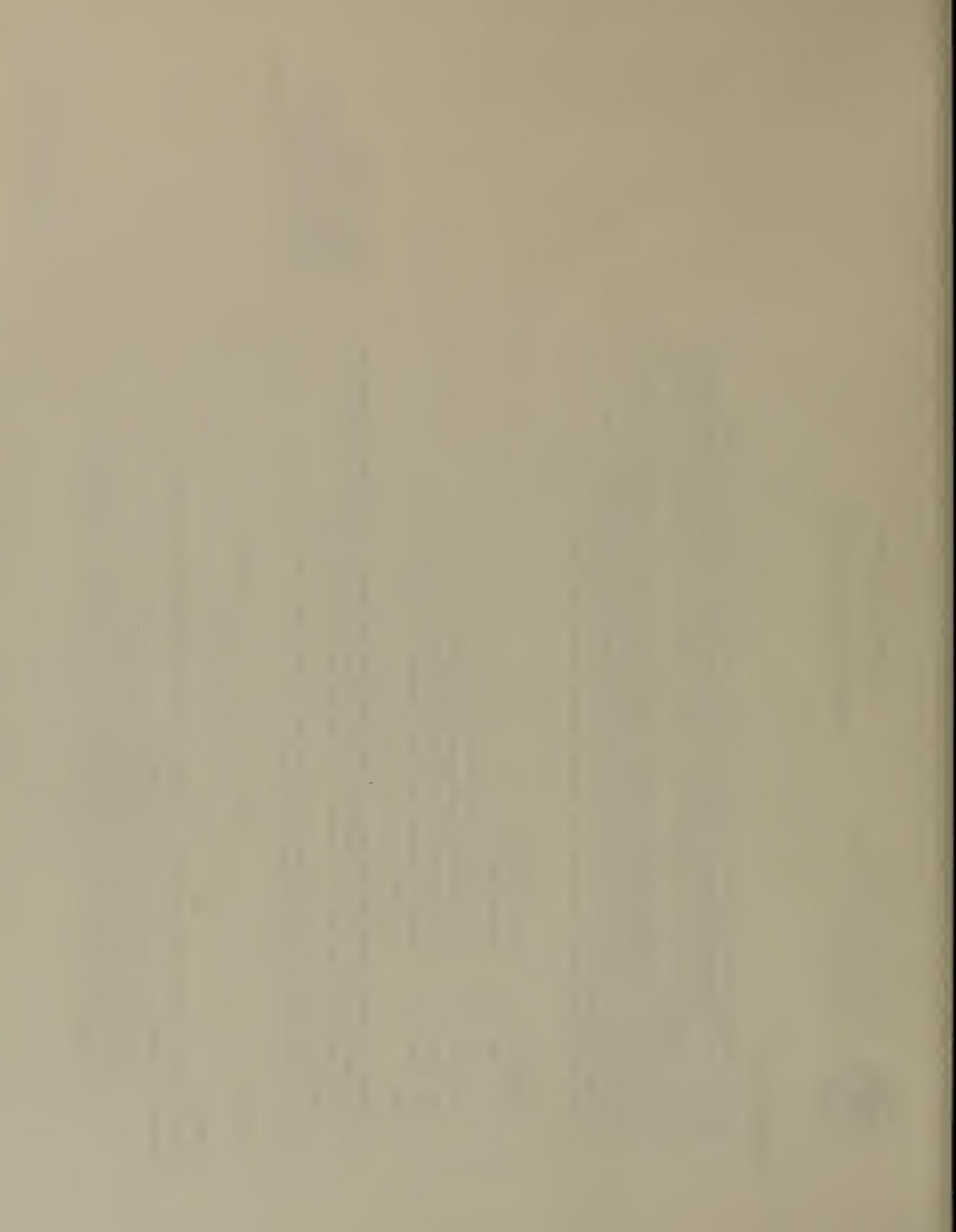
4. Total number of employees at Mine ID XYZ is 193. Hence, check the box inside 100-249 employees.

5. Record information for employees whose numbers are 4, 9, 14, 19, 24, 29, 34 . . . 179, 184, 189.

Note: In this case, a total of 38 employees are in the sample.

MS. SHAIL BUTANI
U.S. Bureau of Mines
Twin Cities Research Center
5629 Minnehaha Avenue South
Minneapolis, MN 55417
CALL COLLECT (612) 725-4500

O.M.B. No. 12119-0098
Approval Exp. 9/30/1986





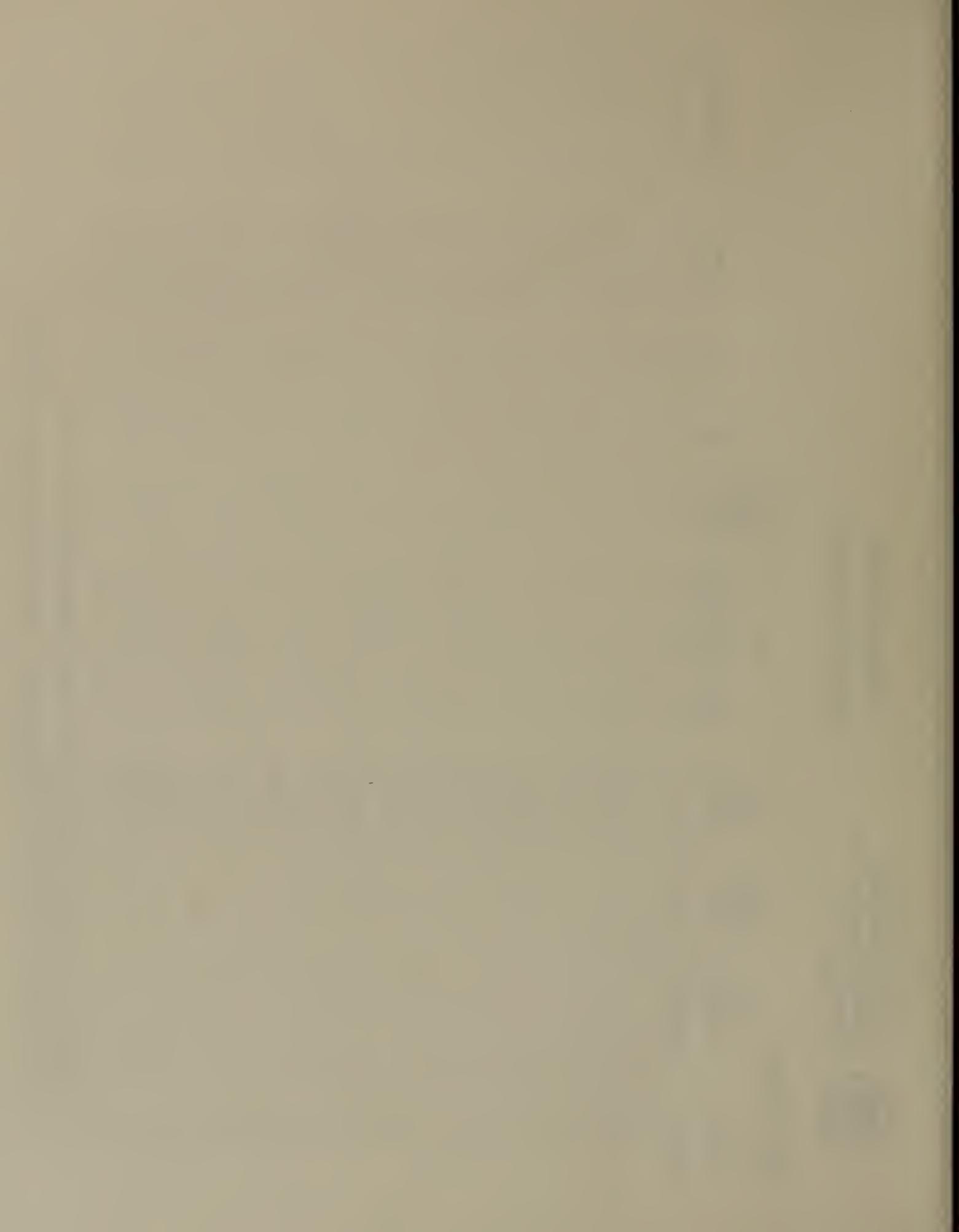
U.S. BUREAU OF MINES
Twin Cities Research Center
5629 Minnehaha Avenue South
Minneapolis, MN 55417
(612) 725-4500

MINING INDUSTRY POPULATION SURVEY

U - underground; SU - surface operations at underground mines; S - surface; P - preparation plant or mill; O - office worker
W - white; B - black; H - hispanic; O - other; U - unknown

W – white; B – black; H – hispanic; O – other; U – unknown

E = 1 through 8th grade; SH = some high school; HD = high school diploma; V = vocational; SC = some college; CD = college degree



U.S. BUREAU OF MINES
 Twin Cities Research Center
 5629 Minnehaha Avenue South
 Minneapolis, MN 55417
 (612) 725-4500



**MINING INDUSTRY
 POPULATION SURVEY**

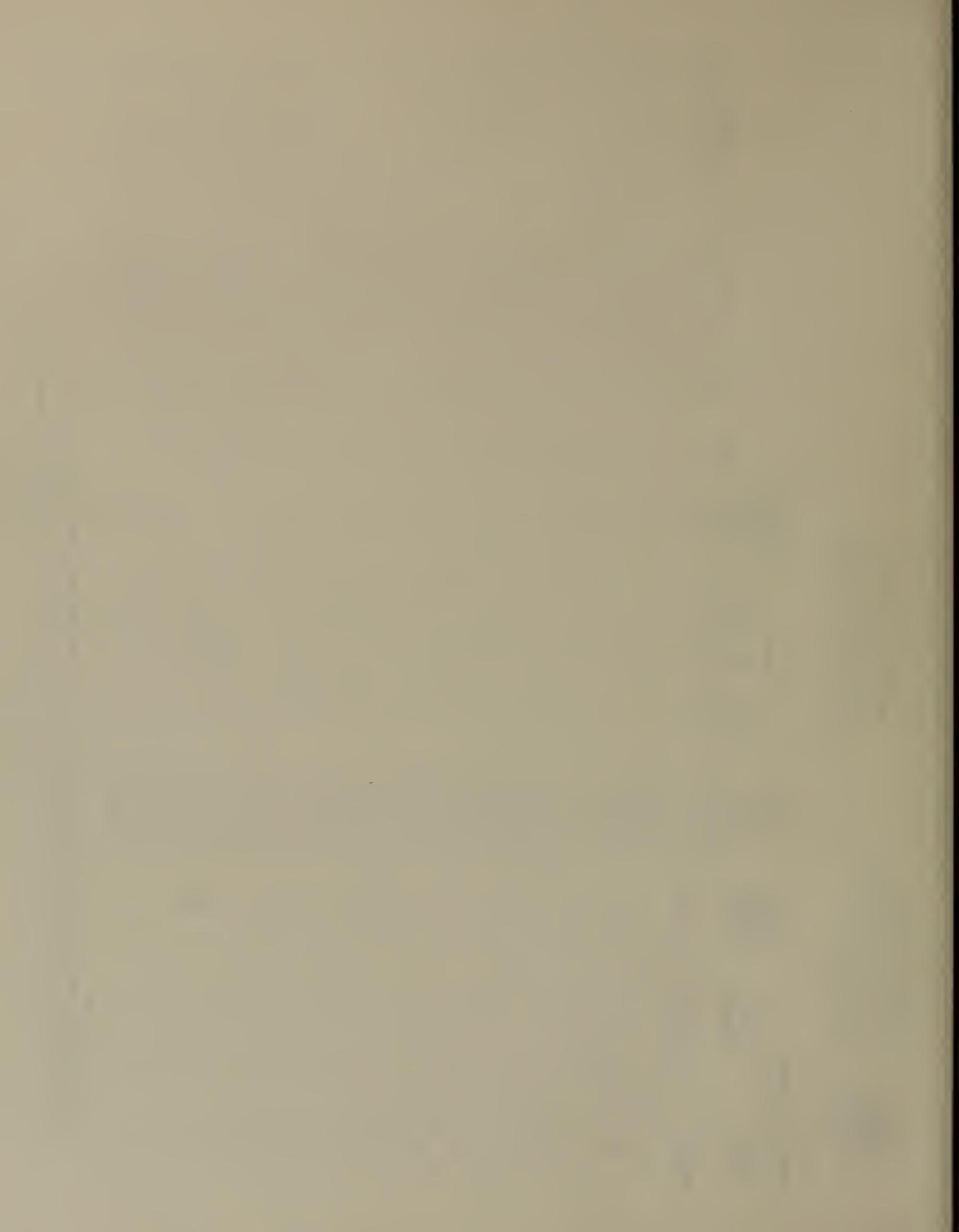
EMPLOYEE DATA:

Sample No.	Job title or occupation	Principal equipment operated (if any)	Principal operation subunit code ¹	Experience				Job-related training during last 2 years	Age yrs. wks/hrs	Sex M F	Race ²				Education ³ E SH HD V SC CD
				U	SU	S	P O				W	B	H	O	
EXAMPLE	truck driver	truck	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>												
21.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
22.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
23.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
24.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
25.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
26.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
27.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
28.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
29.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
30.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
31.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
32.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
33.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
34.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
35.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
36.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
37.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
38.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
39.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
40.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												

¹ U — underground; SU — surface operations at underground mines; S — surface; P — preparation plant or mill; O — office worker

² W — white; B — black; H — hispanic; O — other; U — unknown

³ E — 1 through 8th grade; SH — some high school; HD — high school diploma; V — vocational; SC — some college; CD — college degree





**MINING INDUSTRY
POPULATION SURVEY**

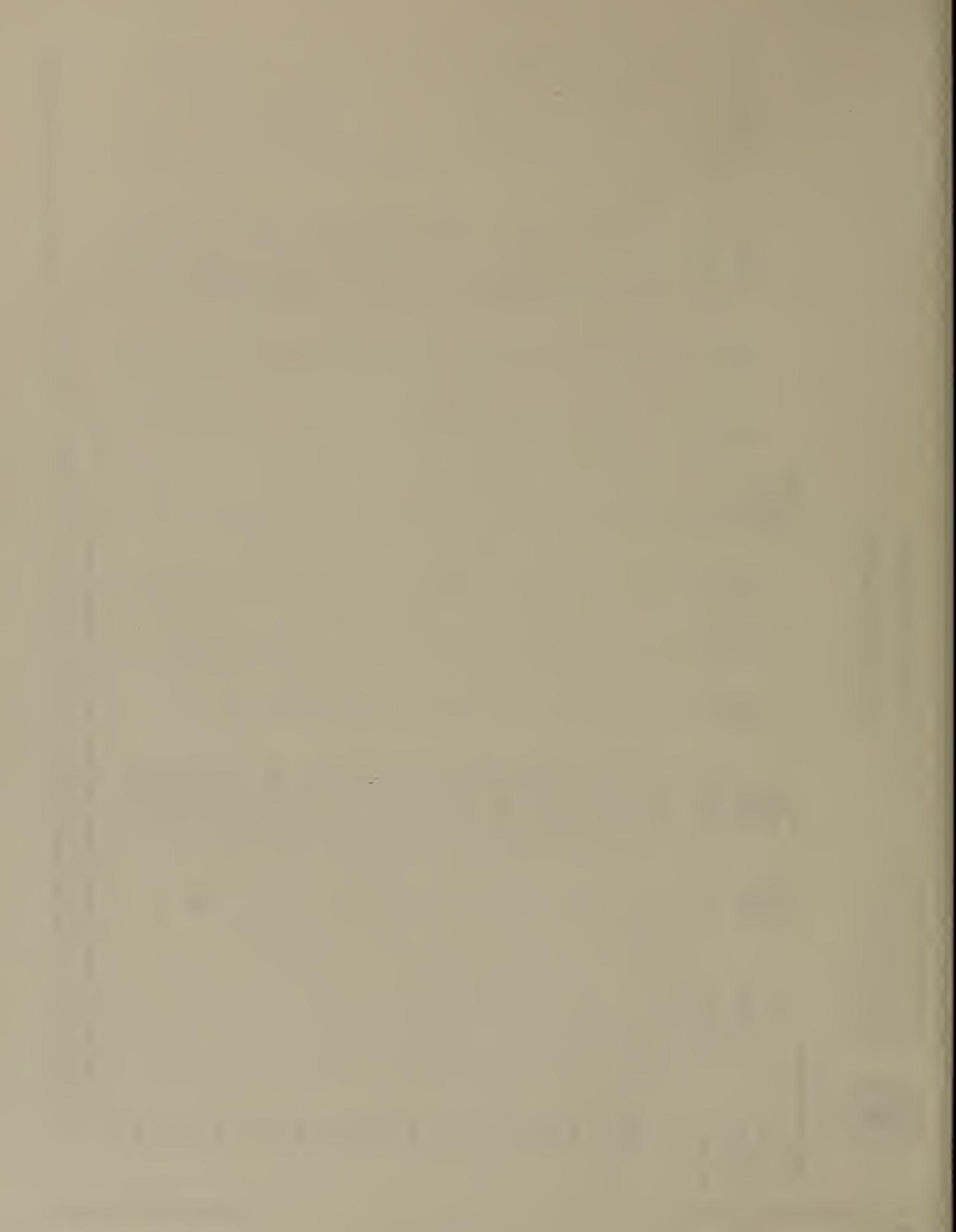
EMPLOYEE DATA:

Sample No.	Job title or occupation	Principal equipment operated (if any)	Principal operation subunit code ¹	Experience				Age yrs.	Job-related training during last 2 years wks/hrs	Race ² W B H O U	Sex M F	Education ³ E SH HD V SC CD
				This job yrs/mo	This co. yrs/mos	Total mine yrs/mos	Experience yrs/mo					
EXAMPLE	truck driver	truck	U SU S P O □□□X□□	5/3	7/0	8/6	4/10	29	29	W B H O U	XX	□□□X□□
41.			□□□□□							□□□□□		□□□□□
42.			□□□□□							□□□□□		□□□□□
43.			□□□□□							□□□□□		□□□□□
44.			□□□□□							□□□□□		□□□□□
45.			□□□□□							□□□□□		□□□□□
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47.			□□□□□							□□□□□		□□□□□
48.			□□□□□							□□□□□		□□□□□
49.			□□□□□							□□□□□		□□□□□
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53.			□□□□□							□□□□□		□□□□□
54.			□□□□□							□□□□□		□□□□□
55.			□□□□□							□□□□□		□□□□□
56.			□□□□□							□□□□□		□□□□□
57.			□□□□□							□□□□□		□□□□□
58.			□□□□□							□□□□□		□□□□□
59.			□□□□□							□□□□□		□□□□□
60.			□□□□□							□□□□□		□□□□□

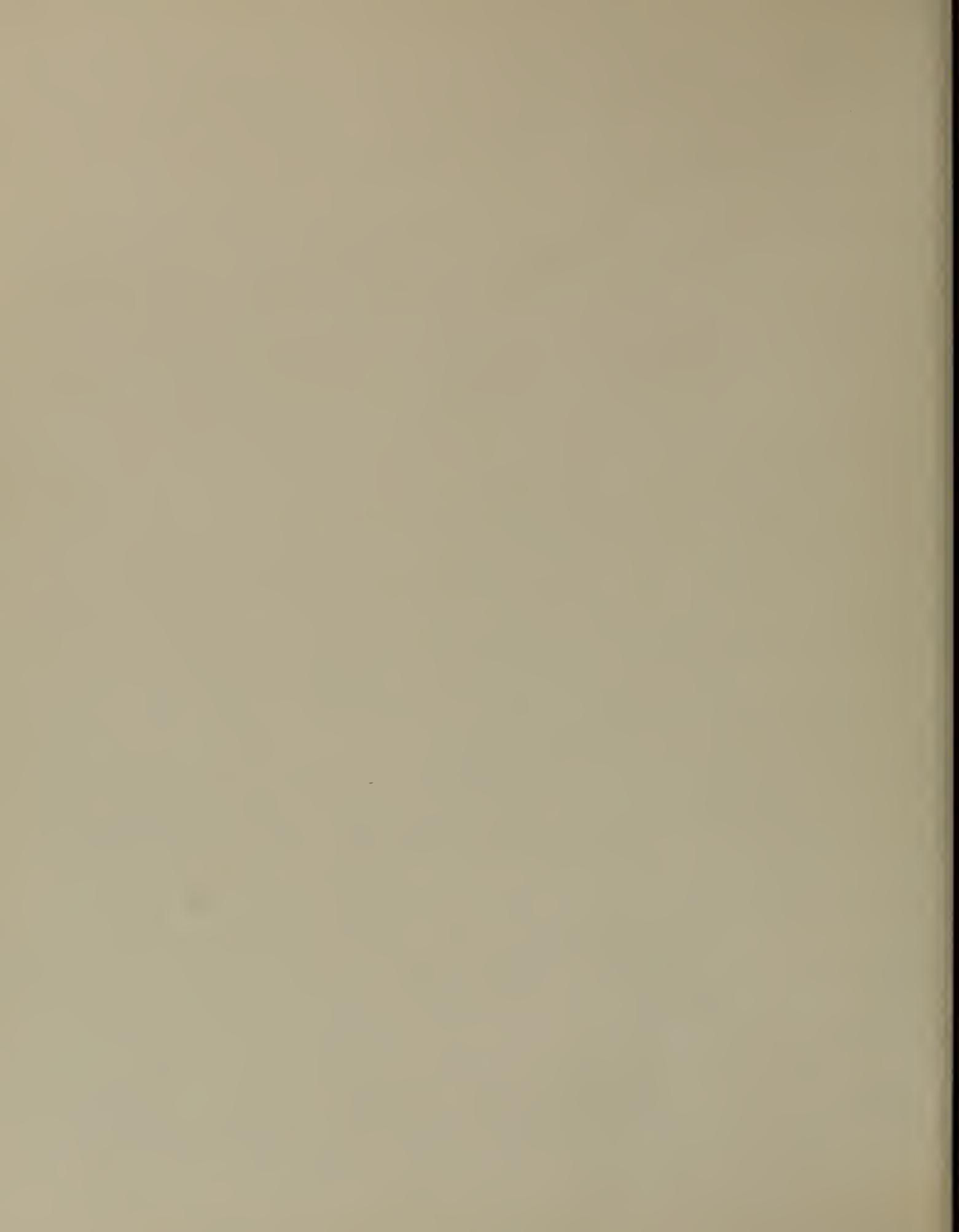
¹ U - underground; SU - surface operations at underground mines; S - surface; P - preparation plant or mill; O - office worker

² W - white; B - black; H - hispanic; O - other; U - unknown

³ E - 1 through 8th grade; SH - some high school; HD - high school diploma; V - vocational; SC - some college; CD - college degree









U.S. Department of the Interior

Bureau of Mines

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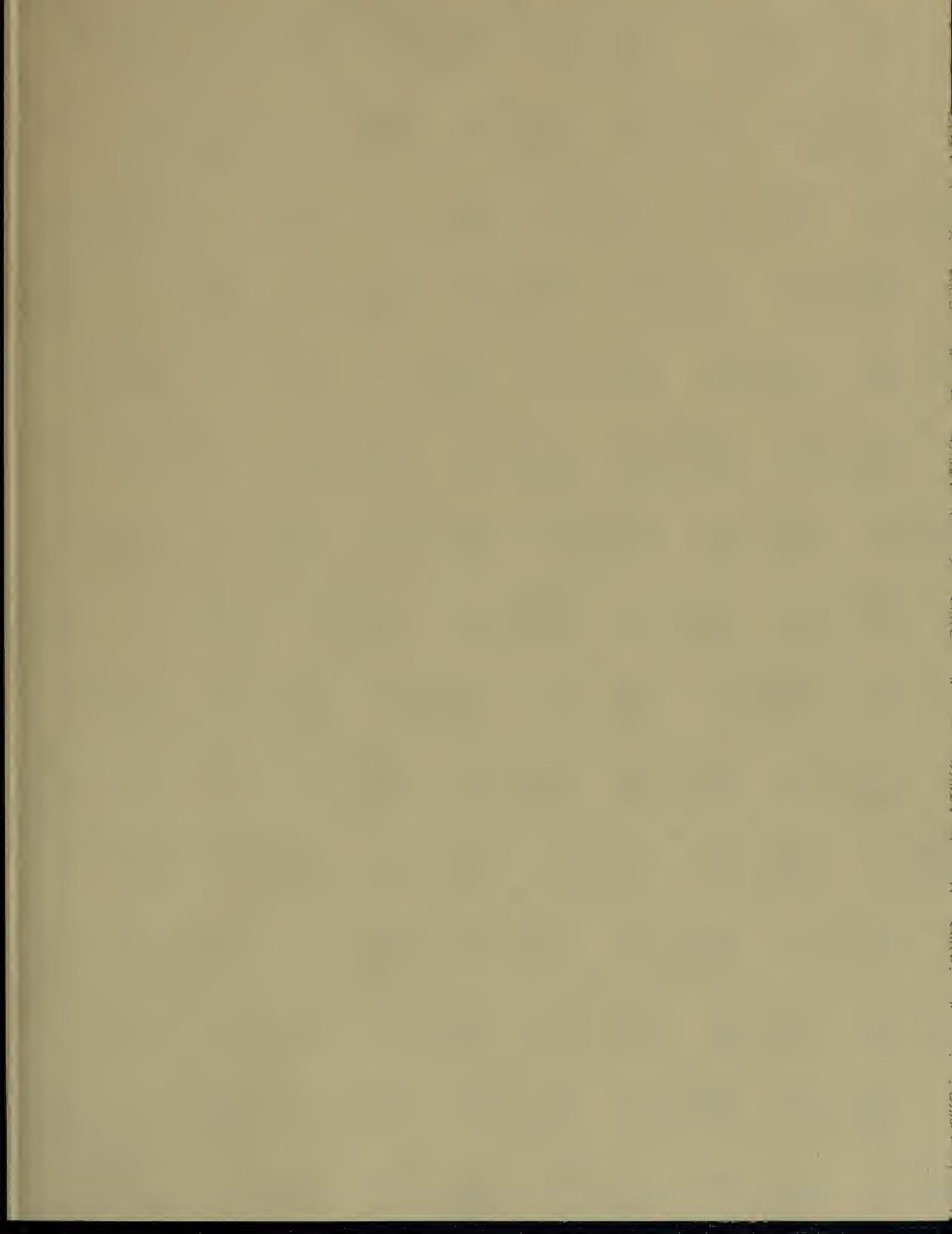
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